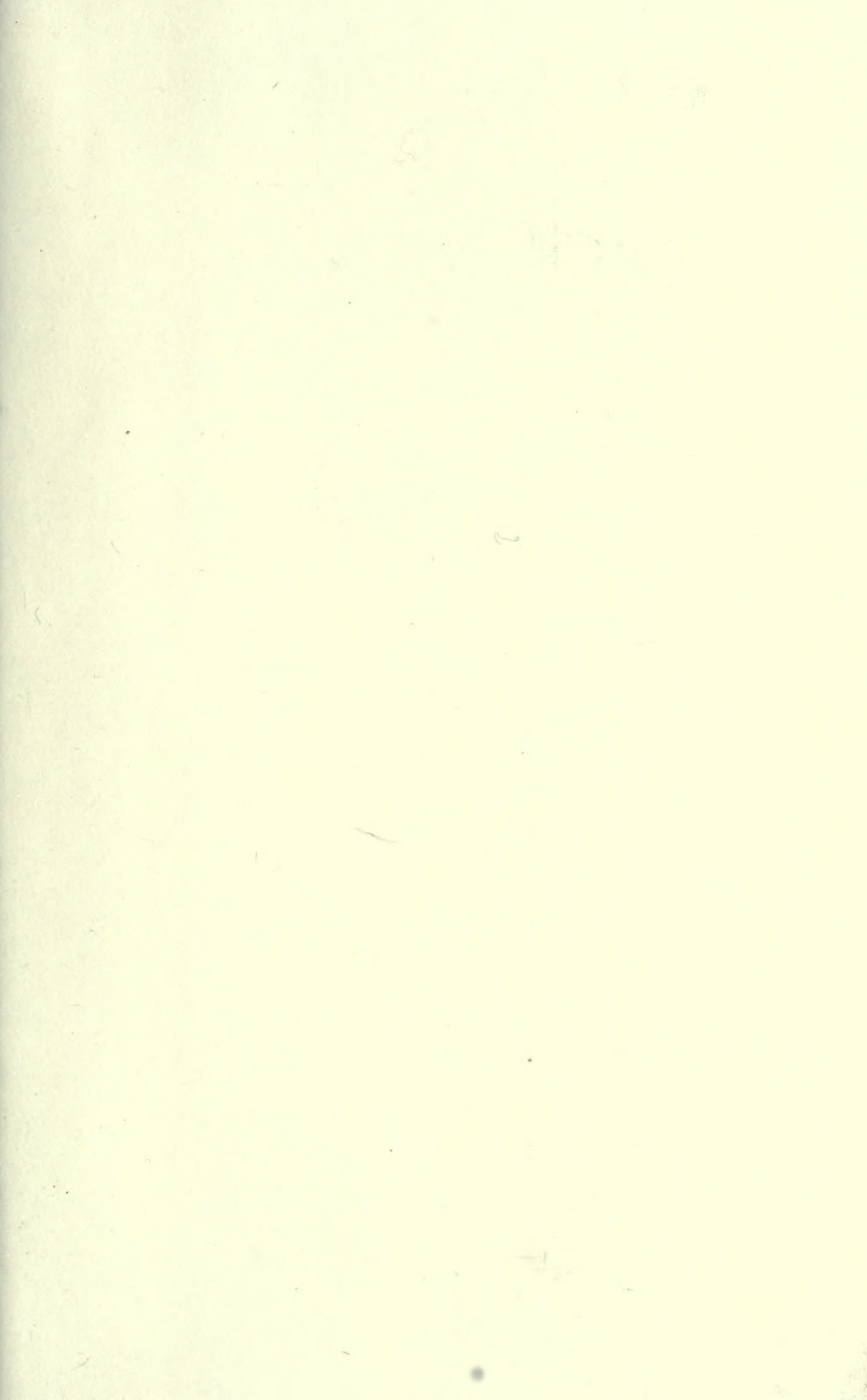
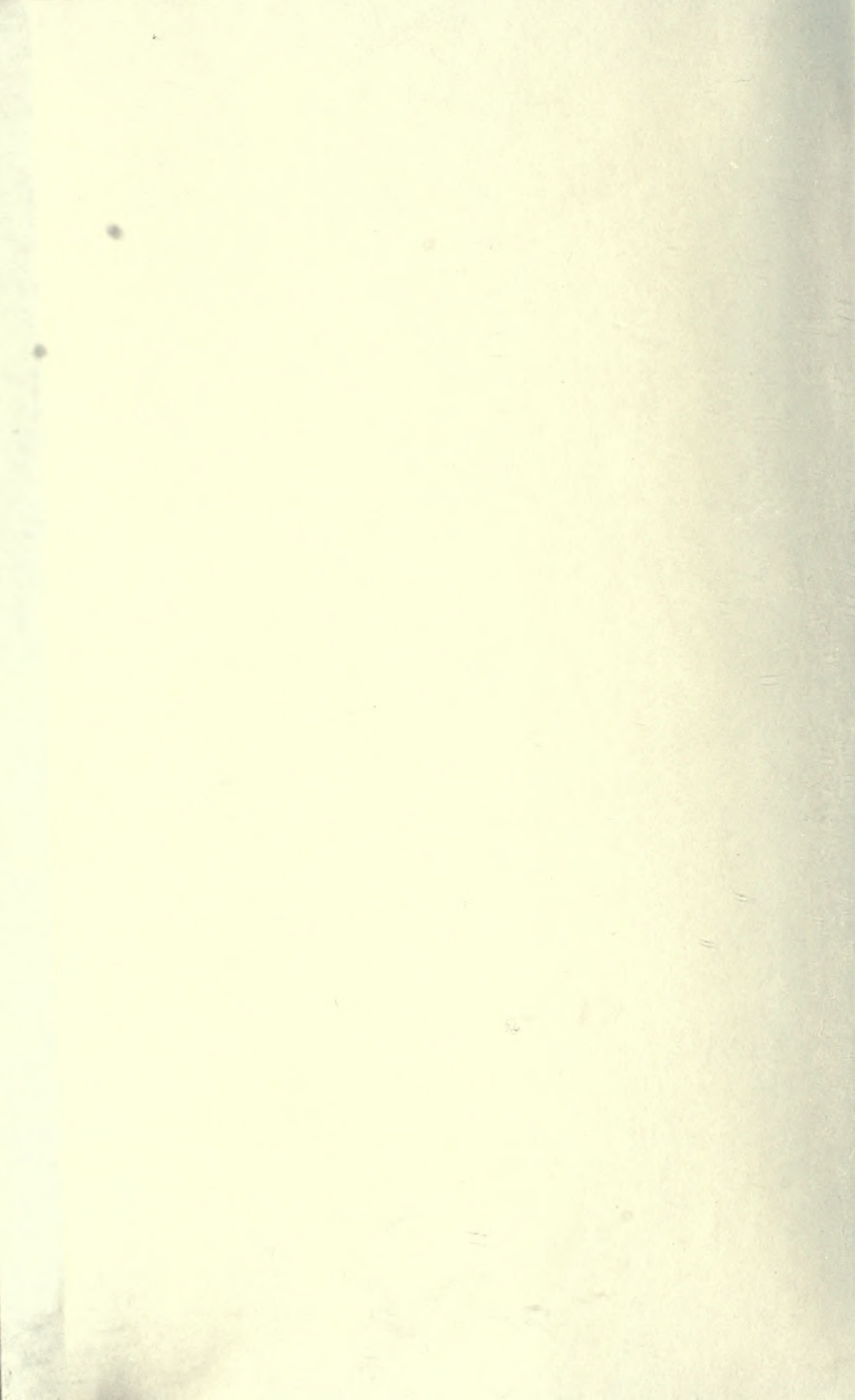




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SANFORD R. GIFFORD, M.D.

OMAHA, NEBRASKA.

This section covers the literature of the subject from August, 1920, to September, 1921. For previous literature, see O. L. v. 16, 1920, p. 269.

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DIGEST OF THE LITERATURE.

BENIGN TUMORS OF LIDS.—Chaillous reports a hard movable tumor of the lower lid, which was transparent to transillumination. It was considered a fibroma or a serous cyst. Griscom reports a woman with multiple *xanthelasmata* which he believes were more extensive than in any case yet reported. The four growths measured as follows: On right upper lid, 28 x 12 mm.; right lower lid, 20 x 7 mm.; left upper lid, 25 x 7 mm.; left lower lid, 12 x 6 mm. They were raised 3-6 mm. from the surface. Several of her family had xanthelasmata. A good cosmetic result was obtained by removal.

S. R. Gifford describes sections of a small growth of the upper lid which showed an unusual histologic picture. It was made up of 8-10 lobules of faintly staining material in which the outlines of epithelial cells could be made out. Epithelial pearls were seen in several. It was considered a benign epithelial growth undergoing hyalin changes.

Martinotti reported 10 cases of syringoma (adenoma of the sweat glands) of the eye lids. Several of the cases were illustrated.

C. and H. Fromaget report a man of seventy with bilateral ptosis due to

tumors of both upper lids. While there was no adenopathy elsewhere, nor any abnormality of the blood picture, sections showed *lymphadenoma*, evidently of the aleukemic variety. Two X-ray applications two weeks apart, totalling 8 H. units, caused complete disappearance of the tumors and there was no recurrence after fourteen months. (Photographs.)

Plasmoma of all four lids in a boy of fourteen was seen by **Schwarzkopf**. The growths had been present nine years on the right side and seven on the left. They were made up of plasmocytes and small round cells showing hyalin degeneration in places. The total white count was normal but lymphocytes were increased to 50-60%.

Caspar has had success in treating six cases of *angioma* of the lids by freezing with CO₂ snow. The application lasts forty seconds to two minutes and is repeated in five to fourteen days. **Halliday** reports a two weeks old child with *angioma* which was being treated by electrolysis and ligation of the vessels.

Duclos saw a black tumor the size of a pea on the lower lid of a man of 45. It was excised with some skin and tarsus. There has been no recurrence in five years. Sections showed a cyst full of hemorrhagic coagulum. Its lining was cuboidal epithelium which had proliferated to form numerous tubules or little cysts projecting into the larger one. It was considered a benign growth of dysembryoplastic origin, i. e. from glands whose structure and function had developed abnormally. **Cavara** classifies the types of lid cysts according to their glands of origin. Sections in his case showed it obstructed either by sclerosis about its duct or by hyperkeratosis of the skin occluding its pore.

Juler's case of multiple *plexiform neuromata* showed nodules on both lower lids, beside numerous lesions elsewhere on the face and body. **Guist** reports a similar case with nodules on both lid borders, (one the size of a pea); a nodule on the palpebral conjunctiva, and two on the bulbar con-

junctiva at the limbus. The literature is discussed.

A. Fuchs describes two pigmented nevi in a girl of fourteen, so placed at the inner angle, that when the lids were closed they appeared like a single growth. They had been present since birth, and must have been present when the lids were united. Their developing in this purely epithelial bridge between the lids argues for the epithelial origin of nevi.

MALIGNANT TUMORS OF LIDS.—*X-ray and radium treatment of epithelioma and carcinoma* is reported fairly often. **Withers** reports in detail his method of using radium in eight illustrative cases out of 100 carcinomata about the eyes so treated. Twenty-five to fifty mg. of radium salt were used in silver tubes protected by lead and rubber. For prolonged applications, paraffined lead plates were placed under the lids to protect the globe. The growths responded well to treatment, and much less deformity was produced than by excision. Cases recurring after excision were less favorable, since the scar tissue breaks down under irradiation. Most were basal celled carcinomata.

In **Hine's** case, a sebaceous horn of the upper lid recurred twice after excision, the last time showing clinical appearances of malignancy. Radium affected a prompt and complete cure. **W. C. and W. M. Bane** showed a case in which a wart of the lower lid had evidently undergone malignant change. The resulting ulcer failed to heal after curettage and application of trichloroacetic acid, but healed under radium. **Finnoff** reports a recurrent neoplasm of the lower lid, which had formed an ulcer 8 mm. in diameter perforating the tarsus. It healed after two radium treatments. **Calhoun's** case of epibulbar carcinoma involving the lower lid was treated with radium after removal. It recurred a year later with involvement of a preauricular gland, but after complete removal of both nodules, there had been no recurrence for six years. Sections after each operation showed carcinoma. **Heuser** reports carcinoma of the lid.

Treatment of epithelioma by excision is reported by **Cavara**. In his case the nodule in the lower lid was thought to be chalazion and incised, revealing a solid growth. Further operation was refused till six months later, when the nodule had increased in size and involved the regional lymph nodes. In spite of removal of the greater part of both lids, and the preauricular glands, and exenteration of the orbit, it recurred in eight months with fatal result. Sections showed epithelioma originating in the Meibomian glands. Sections in **Wick's** case showed fibrochondroepithelioma. The growth involved the lid below the inner angle. It was apparently cured by removal. **Duclos** reports a cystogenic mucous epithelioma of the lower lid. The lid was the seat of multiple cysts surrounded by reddened skin. Wide excision was performed and sections showed a lobulated epithelioma. **Michail** reports metastatic melanotic epithelioma of the lid. **Gimeno** reports cancrioid epithelioma and **Weskamp** neurofibromatosis of the lid. **Nancel-Penard** reports epithelioma of the lid cured by radiotherapy.

SARCOMA.—Leucosarcoma was found in sections of **Imanishi's** case, originating in the tarsus or peritarsal tissue. The patient was 25 years old, and from an analysis of the literature, the author concludes that leucosarcoma is commoner in young people than melanosarcoma. **De Schweinitz**, in a five month old infant, observed a lobulated tumor of slightly bluish color, in the lower lid. It was removed and radium applied. Sections showed a hemangiosarcoma. **Charsley** removed a growth from the lid, which had been incised as a probable chalazion. Two months later the temporal bone was involved and after six months, death occurred, with signs of metastasis into the spine. One pathologist considered the tumor a *perithelioma*, another an alveolar sarcoma.

TUMORS OF THE CONJUNCTIVA AND CARUNCLE

BENIGN TUMORS:—**Duclos** reports an *adenoma* of the bulbar conjunctiva

whose surface had ulcerated. Sections showing tubules of cylindric cells and larger alveoli lined by mucous epithelium. He believes it originated in aberrant mucous glands.

Yano observed a pterygium with a centrally located *cyst*. Sections showed it to be lined with cylindric epithelium and full of a yellowish material. It may have had its origin in a gland of the bulbar conjunctiva carried in by the growth. (Bibliography) **Bistis'** case was similar, the cyst being the size of a pea. He considers that cysts are formed in folds of the conjunctiva which are occluded, their epithelium changing to the columnar type seen in sections. **Couce** and **Poyales** report a tumor of the caruncle in a boy of twelve, simulating sarcoma. Sections showed only inflammatory tissue, so that it was called a pseudosarcoma.

Fagin's case had nodules on the under surface of all the lids and in the neck, which were disappearing under radium treatment. Sections of a nodule showed *lymphoma*. The tumor in **Triebenstein's** case of aleukemic lymphadenosis probably arose in the subconjunctival lymphoid tissue. (See Tumors of the Orbit.) **Kalt** observed a nodule the size of a nut in the upper fold. Sections after removal showed it to be a lymphoma. A year after removal there had been no local recurrence, but similar nodules had developed in the lower fold and in the upper fold of the other eye. The blood showed a slight increase in mononuclears and lymphocytes.

Fusihiri describes as *plasmoma* a nodule on the bulbar conjunctiva which was composed entirely of plasma cells. The patient had no trachoma.

The *mixed tumor* reported by **Valude** and **Offret**, in a child of twenty months, extended from the outer angle to the middle of the cornea, and up and out to the folds. Sections showed it to be composed of glandular elements, hyalin cartilage, fat, and lymphoid tissue around the lumen of the glands. It was surrounded by normal conjunctiva onto which the glands

opened. The author considers it to be similar in nature to the mixed tumors of the salivary glands, and probably due to an inclusion in the ocular fissure of remains of the upper maxillary cleft. Its nearness to the lacrimal gland may explain some of its glandular elements. **Novak's** case (See tumors of the cornea) had large lobulated reddish yellow masses under the conjunctiva, extending to the outer angle and back into the orbit.

Zimmermann discusses the histology of conjunctival *melanosis*. In his case, a nevus had increased in size for the past year, covering the lower third of the tarsal conjunctiva. The arrangement of the cells in relation to typical nevus cells and presence of many nevus like pigmented cells in all strata of the epithelium indicated an epithelial origin.

Dunnington reported a case of melanoma of the limbus in a boy 15 years of age. The tumor was first noticed 10 years before, following an attack of measles. The mass measured 3.5x7.5 mm. and extended on to the cornea 3.5 mm. It had never increased in size. The author believed that the mass belonged to the group of pigmented nevi.

Pedunculated *angioma* is reported by **Troche**. His two cases were typical. Review of the literature emphasizes the fact that, tho these tumors are benign, they tend to recur in situ, unless 2 or 3 mm. of healthy conjunctiva is included in their excision. **Herrenschwand** discusses the five cases of subconjunctival angioma previously reported and reports a sixth case. His patient, a boy of twenty-one, had noted the lesion for six months. It was increasing. A flat bluish red area was seen on the lower half of the bulbar conjunctiva, spreading out to the inner canthus and almost to the midline. The conjunctiva was movable over it. At operation, it was found to be adherent to the sclera and apparently arose from the sheath of the inferior rectus. Sections showed a mass of capillaries a good deal of connective tissue, some small round cell infiltrate and some pigment deposits.

Butler reports a baby with partial coloboma of the lid and a *dermoid cyst* under the bulbar conjunctiva. It reached the limbus, but did not involve the cornea. Yellowish nodules were present on lids and temples, probably valvi.

MALIGNANT TUMORS:—**Coover** saw a new growth arising at the site of a pterygium previously removed. It extended from the limbus over the lower, inner part of the cornea and projected over the lower lid. It was removed and sections showed papilloma. In eleven years, it recurred, covering the cornea and pushing the lids out. At enucleation, basal celled *epithelioma* was reported. An epibulbar epithelioma, reported by **Michail**, caused penetration of the globe requiring enucleation.

Valude studied 9 cases with tumors of the limbus. In one case the tumor was a squamous celled epithelioma; seven were epithelial nevi or pigmented neurocarcinomas, and one was a malignant nonpigmented nevus of the basal epithelium. The author discusses the origin and nature of nevi of the limbus, and concludes that complete local removal usually results in a cure, and that enucleation is not usually necessary. If there is any tendency of the tumor to recur, X-ray or radium should be used before enucleation is attempted.

In **Wolff** and **Deelman's** case a small black spot on the bulbar conjunctiva had been growing in size for the past few years, and showed a superficial stripe of pigment about the central nodule. It was excised widely, followed by X-ray treatment. Sections showed it to be an alveolar *melanosarcoma*. The literature is discussed. **Heller** reports *melanosarcoma* of the bulbar conjunctiva.

Boyd presented for diagnosis a case with a new growth near the limbus. A small red spot, present for one and a half years, had been increasing in size for the past six months, had changed to a yellowish color and showed considerable engorgement of the surrounding vessels. **Excision** and

cauterization of the base was recommended.

Kafka reported a case of epibulbar melanosarcoma which occurred in a woman 67 years of age. The tumor had been removed a year before but had recurred. The author excised as much of the growth as was possible and exposed the remainder of the growth to the X-rays. Exposures of 30 to 40 minutes were given at intervals of 3 or 4 weeks for 5 sittings. The tumor diminished gradually and only a slight trace of pigment remained.

Schiller's case, reported as sarcoma of the lid, evidently originated in the palpebral conjunctiva. It showed a black elevation from the lid border to the retrotarsal fold. On removal, sections showed cords of lymphoid cells containing much pigment. It appeared at the site of a chalazion removed a year before. **Oyenard** reports sarcoma of the limbus.

Curran saw a sarcoma of the subconjunctival tissue in a man 50 years of age. The tumor was $\frac{3}{4}$ of an inch in diameter, and extended from the cornea to the caruncle of the left eye. The mass was nodular and resembled multiple cysts. The microscopic examination identified the tumor as sarcoma.

TUMORS OF THE CORNEA. BENIGN TUMORS:—**Ticho** reports an epibulbar tumor present since birth in a girl of 25. It was 8 by 4 mm. situated at the upper limbus, with a cyst in its scleral part. Sections showed a *fibrolipoma*, with a cyst lined with epithelium. **Rumbaur** saw a large congenital *dermoid* in a one year old child. It was at the upper limbus, measured 12 by 17 mm. in extent, and covered the cornea to the center. There were no other congenital anomalies present. **Novak's** case showed multiple congenital anomalies. Symmetric dermoids were present at the limbus, temporally in R. nasally in L. They were of pea size, extending slightly onto the cornea. Besides this, there were subconjunctival growths (See tumors of conjunctiva) extreme dolichocephalicy, nevi of the scalp and cheek, ectopia, of the pupils,

and atypic coloboma of the choroid in each eye.

Fowler reported a case with a large tumor, evidently a dermoid, that extended from the external canthus inwards and covered two-thirds of the cornea. The tumor was adherent to the sclera and the external rectus muscle.

Papilloma of the limbus was seen by **Boehm** in three cases. They were pink, smooth growths, movable on the conjunctival side, composed of regular lobules. One recurred twice after removal, until the third removal was followed by radium. The second case was treated with radium from the first, with cure. The third was excised in three sittings, leaving clear cornea after removal, and the author thinks this is the method of choice, as radium produced corneal opacities. The literature is discussed. **Hirsch** reports papilloma of the cornea.

Wolfe and **Wahrer** report a hairy *pigmented mole* at the limbus in a girl of twelve, present since birth. The hairs were removed, but the growth left. **Chance** reports symmetric neoplastic degeneration in a woman, possibly as the result of acne rosacea. The colloid epithelial masses on each cornea were shaven off with a Graefe knife. **Chevallereau** and **Offret** saw a case of *xeroderma pigmentosum* with unusual ocular lesions. Many lesions were present on the right side of the face, and at the inner limbus, extending $\frac{1}{2}$ millimeter onto the cornea was a nodule resembling epithelioma. It was dissected off and radium used afterwards. The other eye had previously been enucleated for a similar tumor which had recurred after simple excision. The exact nature of the tumor and its relation to the skin lesions was not made clear.

MALIGNANT TUMORS:—The surgical treatment of *epithelioma* is discussed by **Francis** with notes of three cases. He describes his technic for removing a wedge shaped piece of cornea extending almost down to Descemet's membrane, including the diseased area, and a good deal of episcleral tissue, and for drawing

a conjunctival flap over the defect remaining. **Duncan** reports a pedunculated epithelioma of the limbus which he excised, including a funnel shaped hole at the site of its attachment, this being followed by four radium treatments. Cure had persisted for two years. In **Fusita's** case, a carcinoma of the limbus had penetrated the globe. Sections showed the tumor cells passing along the ciliary vessels and invading the ciliary body, iris root, and suprachoroidal space.

De Schweinitz saw a carcinoma at the site of a papilloma removed nine years ago. When the author saw it, the tumor was about 2 cm. in diameter, partly adherent to the cornea, and probably extended into the orbit. The orbit was exenterated, and radium used in the socket. There had been no recurrence for 18 months. Sections showed a squamous celled epithelioma.

Marbourg presented a case where the diagnosis between pigmented mole and melanosarcoma was in question. His patient, a girl of fourteen, had a pigmented area 2 by 3 mm. in extent at the nasal limbus, which had been increasing in size. In the discussion, observation and removal of a part for diagnosis were recommended. **Wilder's** case resembled this, but had increased in the last four years to an area 10x1 1/2 mm., in extent covering the cornea for 1 1/2 mm., so that it was considered as probably a melanosarcoma. Radium was being used.

Upon microscopic examination of an atrophic eye **Meller** discovered a small sarcoma of the cornea. The eye had been injured 15 years previous to the enucleation. Prior to the injury, there had been no evidence of intraocular tumor. The author believed that in this case there was great probability that the tumor developed after the eye had become atrophic, following the trauma. **Meller** calls attention to the fact that a sarcoma rarely originates in an atrophic eye per se. Occasionally an intraocular sarcoma, thru degeneration, causes atrophy of the globe, and in this case a secondary or metastatic sarcoma

might be mistaken for a primary growth.

TUMORS OF SCLERA.—**Friede** reports a congenital serous cyst embedded deep in the sclera, pressing against the conjunctiva so that the lower chamber angle was opened and aqueous flowed out around the cyst subconjunctivally. A chronic edema like that of a trephine opening was produced. Choked disc was present on that side, probably from the constant low intraocular tension.

DIAGNOSIS OF INTRAOCULAR TUMORS: **Pontano** describes a test for *echinococcus* cysts. 0.2 to 0.3 cc. cyst fluid is injected intracutaneously, 0.2 to 0.3 cc. or 1 cc. subcutaneously. Marked local reaction occurs in 84% of patients who have echinococcus cysts.

TUMORS OF IRIS. *Cysts:*—**McMullen's** case of cyst gave no history of any injury. Tension was normal and there was no visual disturbance. The possibility was brought out in the discussion that it might not be spontaneous, but due to a wound of the cornea which had passed unobserved. **Halliday** described a cyst in a girl of twelve who had wounded her eye with a stick three years before, lacerating the iris and later developing traumatic cataract. Now a small area of pigmented epithelium is seen near the edge of the pupil, which the author considers to be probably an implantation cyst, and which he intends to observe for some time before an operation is undertaken. **Rumbaur** describes a pearl cyst developing five months after penetrating wound. Sections showed its origin from the follicle of a cilium carried into the wound. He believes a fissure is present between the cells of the follicle, which becomes a cyst, filled with cast off cornified cell lamellae, this accounting for the pearly luster of these cysts. (See also p. 183 and p. 165.)

Demaria reports a case of spontaneous cyst in a woman of fifty-one, in which he used an ionizing current to destroy the growth. Putting only the negative pole into the cyst produced a temporary decrease in size, but when both poles were used a prompt disappearance of the cyst was produced.

Cataract developed. **Zeemann** reports a case of pearl cyst apparently from implanted lashes. **Fischer** reports a case of cyst which is unusual in that it developed from the posterior pigment epithelium of the iris. Sections after iridectomy showed that its anterior wall was the pigment epithelium, and that its posterior wall was made up of one layer of similar pigmented cells. There have been only five such cases reported. Their interest lies in the fact that the iris has only one layer of epithelium, and hence they must be formed by proliferation of epithelium, not by separation of two layers, as with cysts of the ciliary body.

Melanoma:—**Stirling's** case had noticed a brown speck after twenty years which had increased so as to include about 3/4 of the iris. Vision began to fail months before from secondary glaucoma. Sections showed a superficial growth, involving the anterior layer of the iris only, and being composed of endothelial cells containing pigment.

Broughton presented two cases in which the choice of treatment was in question. One showed a brown spot $4\frac{1}{2}$ by $2\frac{1}{2}$ mm. in size in the iris, with unusually normal vision in spite of occasional attack of "blurring." It was to be kept under observation. The second case had a larger nodule, and vision was reduced to 20/40, apparently by secondary glaucoma. The consensus of opinion was in favor of enucleation in this case, tho **Knapp** advised using radium first.

SARCOMA:—**Melanosarcoma** is reported by **Clopton** in a girl of 3. The nodule had been noticed for two years. Two years after enucleation the tumor recurred in the orbit. **Teulières** reports the case of a man of 65, with a tumor filling half of the anterior chamber. Tension was 35 mm. but there was no pain. There was no recurrence 15 months after enucleation. Sections showed *leukosarcoma* in the stroma of the iris. The ray like arrangement of fusiform cells suggested endothelioma. The sclera was infiltrated with the tumor cells.

TUMORS OF THE CILIARY BODY. **Fischer** reports a cyst of the ciliary body in an otherwise normal eye. Its posterior wall was made up of pigmented epithelium, its anterior wall of unpigmented epithelium, showing its mode of development by separation of the two epithelial layers of the ciliary body.

Wunderlich gives the findings in four eyes, enucleated for various reasons, which showed tumors of the ciliary body. All showed the structure of true epithelial tumors, were small and benign, and apparently developed from the inner pigment layer of the ciliary body. They all occurred in old people, and all the eyes had been the seat of some kind of inflammation, which may have been a factor in stimulating their growth.

Primary *epithelioma* is reported by **Hine** in a man of 28. Vision had been poor in R. for three months, and for three weeks a small spot in the pupil had been noticed. Attacks of corneal edema occurred which reduced vision temporarily, but there was no rise of tension. An iridectomy was made in an attempt to remove the tumor, which could be seen thru the pupil back of the iris. The iris was not adherent to the tumor, however, which could now be seen to arise from the ciliary body. Enucleation was done later, and sections showed it to originate from the epithelium of the ciliary processes. The literature is discussed, this being the tenth case to be reported.

Demaria's patient was a child of five, in whom the diagnosis of intraocular tumor had been made three years before. The eye was now painful, with a staphyloma above the cornea, a gray mass in the pupil, and no light perception. Sections showed that the tumor arose from the epithelium of the upper ciliary processes, and had infiltrated the whole anterior segment of the globe, the posterior segment, however, being free from extension. It showed the typical structure of *glioma* of the alveolar type, with rosettes. Eight cases had previously been reported.

Heitmann observed a girl of 13 with reddish brown tumor seen at the iris

root thru an iridodialysis. Enucleation was done, and sections showed what was probably a spindle celled *sarcoma*, with some pigment. **Cosmettatos** reports primary melanosa. Four months after being struck on the brow over the left eye, his patient noticed poor vision in that eye. A small black tumor was seen at the outer side of the ciliary body. Enucleation was consented to 14 months later. The tumor was 9 by 14 mm. in size, and composed of masses of round cells, each grouped around a central vessel. There was much pigment, free and in the cells, and large necrotic areas. It probably originated from the endothelium of the vessels. Not over fifty cases of sarcoma of the ciliary body have been reported.

Franz discusses the occurrence of *hypotony with intraocular tumors*. He describes three cases of detachment of the retina and hypotony, all of which had tumors affecting the ciliary body. The hypotony may be due to the resulting decrease in the secretion of aqueous. The author calls attention to the need of early diagnosis in these cases with hypotension.

TUMORS OF THE CHOROID:—Henderson reports *angioma* of the choroid in a girl of 8. When first seen, the fundus was normal, but there was a large nevus of the left side of the forehead, lower lid, and temporal region. The left eye was amblyopic. Three years later there was complete detachment of the retina of the left eye, which the author decided was due to angioma. (Literature)

Von Szily discusses *melanoma* of the choroid. He has seen several cases in which the pigmented tumor did not increase in size over several years' observation. One of these eyes was later enucleated for epibulbar carcinoma, and sections are described. They showed the choroidal growth to be made up of nests chromatophors. The pigment epithelium was not involved. There were no nevus cells, nor any evidence of malignancy.

Carcinoma:—Shioji reports metastatic carcinoma into the choroid, ciliary

body, optic nerve and ciliary nerves. After operation for cancer of the breast, a tumor developed in the right eye, which was enucleated. Two months later, vision failed in L. and death occurred soon after from general metastases. Besides tumors in nearly all the viscera, the ocular growths referred to were found in L. at autopsy. **Rolandi** reports a similar case, also after breast amputation. After sixteen months, vision failed in right eye, and two months later secondary glaucoma set in. Sections showed a small alveolar carcinoma of the choroid, with total detachment. The increased tension was apparently due to the subretinal exudate.

Salzer's case of carcinoma showed a nodule in the choroid near the ciliary body, and a swollen lymph node. X-ray treatments were continued, under careful observation, for over two years. After thirty doses; the original tumor is barely visible, and there is no evidence of metastasis. The lens is diffusely cloudy, vision being 1/50, but no other damage to the eye from the treatment is demonstrable. The author puts forth the theory that early enucleation involves more danger of fatal metastases because the organism has not, at that time, developed any immunity to the hypothetical "stimulating substance." A course of irradiation would therefore seem safer, even if enucleation later became necessary. **Steichele** reports metastatic carcinoma of the choroid. **Cridland** presented a case with a tumor of undetermined origin, probably choroidal, covering the disc.

SARCOMA OF CHOROID:—Marbaix observed a case of melanosa for five and a half years, till the tumor filled half the globe. Sections showed the intraocular growth to be an alveolar melanosa, but a small extraocular tumor, tho of the same structure, showed no pigment. **Velhagen's** patient had a hard, blind, painful eye which was suspected of tumor and enucleated. The eye showed two sarcomata, the larger one of small, round celled, alveolar, structures, the smaller of spindle cells. He considered

the spindle celled tumor as secondary to the other. The patient died after eight months, of metastasis in the liver.

Ellett trephined a blind eye on account of pain and tension. A prolapse of dark tissue occurred in the trephine hole, and the eye was enucleated. A melanosa sarcoma was found at the posterior pole, 7 by 11 by 3 mm. in size. The prolapse was found to be vitreous, covered by almost all the retina. The patient died in a few months of abdominal tumor. Two other cases were mentioned to emphasize the author's point that any blind eye which develops glaucoma without known cause should be suspected and enucleated. In the discussion, Green mentioned two cases of sarcoma with low tension, where the tumor was discovered only at the time of puncture for the detachment.

Francis reports a case with a tumor and retinal detachment, in which the tension taken at four different times showed a steady decrease from 20 to 5 mm. during 2 1/2 years. Sections showed melanosa sarcoma. **Kadletz** describes a leukosa sarcoma existing without detachment. A fungoid tumor was present at the posterior pole, which sections showed to be fascicular, unpigmented sarcoma with necrosis. The retina was split in two layers, the layer of nerve fibers only covering the tumor, while the other layers, only slightly atropic, were posterior to it. The tumor had evidently perforated these layers, and continued to grow in the fissure so formed.

Doesschate's patient developed sarcoma in both eyes. When first seen, the vision had been failing for two weeks, and was 1/60. There was detachment, but transillumination was negative and tension normal. Five months later, secondary glaucoma occurred, and there were signs of general metastasis, nodules in the skin emaciation and marked melaniauria. Three days after enucleation, vision failed in the other eye to 6/60, and a detachment was seen. At postmortem in seven months, melanosa sarcoma

of both eyes was found, that in the second eye being considered a metastasis from the right eye.

Fischöeder gives the results of *X-ray treatment* where sarcoma developed in the only eye. Two courses of ten treatments were given, exposure being made over the skull, cheek, and anterior surface. The tumor became stationary under treatment. A rather severe conjunctivitis developed, and a deep inflammation of the cornea, combined with small nodular opacities under the epithelium, but this later cleared up. **Bentzen** and also **Imatomi** report sarcoma of the choroid.

Heymans discusses the question of ocular tension in uveal tumors. Of twelve cases, four showed hypotension, and two normal tension. These had never passed thru any period of high tension, and since some had existed for 2 to 4 years, the implication is that they never would. Only six cases, or 50% showed increase of tension. No definite relation was observed between tension and size or location of the tumor; but in all with hypertension, the filtration angle was more or less completely effaced. It is suggested that these cases without increase of tension may have an iridocyclitis at some time which keeps the tension down.

Meesman describes the use of the slit lamp in a case of melanosa sarcoma. He could see into the depth of the tumor, recognizing its nodular structure and spots of pigment. Sections after enucleation showed a picture similar to that observed during life.

TUMORS OF RETINA:—**Davis** describes the case of a woman of 57 with two round transparent tumors projecting into the vitreous of the right eye. They were not movable. The author considers them *cysts* of the retina.

Granuloma:—**Elschnig**, in a woman of 55, first saw a yellowish spots in the macular region. Later, a whitish tumefaction of 3 D. appeared. The eye was enucleated and sections showed the nodule to be limited to the retina, and composed of connective tissue with fine vessels. He considered it granulation tissue and not a true tumor.

Hedde discusses pigment anomalies of the retina and reports a new case (the 14th) of *nevroid pigmentation*. Both retinas showed, in the deepest layers, pointed and round pigmented areas of a granular appearance. He believes they originated in the pigment epithelium.

Offret and Pascano report a previously undescribed condition, *cholesteatoma* of the retina. The mother of their patient, a boy of 6 1/2 years, had noticed a shiny reflex from his left eye for some years. A grayish tumor was seen covering the fundus and extending forward almost to the lens. During one month it seemed to increase in size, but the tension remained normal. Left eye was normal. Right eye was enucleated. Sections showed the retina to be uniformly thickened but not detached. Small shiny nodules were seen on the surface, containing crystals which gave the tests for cholesterolin. Each nodule consisted of peripheral connective tissue containing nests of pigmented cells, penetrated in all directions by linear clefts and cavities, the sites of crystals. At the periphery of the tumor, a ring of pigmented cells showed its extension. It apparently originated from the pigment epithelium in the ciliary region. The crystals were probably formed from lipoids of broken down pigment granules. A complete description with figures is given.

Doesschate's patient had been operated six years before for melanosarcoma of the mamma. Three years later, symptoms of iritis and glaucoma in the left eye set in and a diagnosis of tumor was made. Vision in right eye then gradually failed to 2/60. At post-mortem a large tumor was found in the left eye and five separate tumors in the retina of the right eye. They were mixed leuco- and melanosarcomata. The author believes this to be first reported case of true retinal metastases from outside the globe.

GLIOMA:—**Patton** reports two cases. In one, the child's mother had noticed only a slight divergence, and the tumor could be seen with the ophthalmoscope

only thru a dilated pupil. Sections of the nerve showed no extension, but radium was used in the orbit. The second child showed a larger tumor and sections of the nerve showed extension. Radium was used twice in the orbit, with no recurrence in six months.

Gibson reports glioma in each eye treated by double enucleation. **Moodie's** similar case was living, with no recurrence after six months. In **Tyson's** case of double glioma, the first eye was enucleated and the second treated with radium. It died in six months. A second case, unilateral, was apparently cured after five months by enucleation followed by radium. Both cases were Jewish and all of the 26 cases he has seen were partly Jewish.

Chase reports in detail a case of double glioma in which, after enucleating the first eye, the second was treated with radium. After three months, the growth was flatter, but similar in extent. In a later, personal communication to the reviewer, the author states that enucleation became necessary on account of the growth of the tumor. The literature of cases treated by radium was discussed. **Poyales** saw a similar case with advanced glioma of one eye and small yellowish masses in the retina of the other. Radium was used on both eyes, three exposures a week being given. After about eight months the engorged vessels had disappeared and the large tumor had decreased somewhat in volume. The child is still under treatment. **Knapp** discusses in detail the use of radium for glioma. **Schoenberg's** case is the only one in which a definite arrest of the tumor with preservation of vision has persisted for three years. His own case, in which radium was used on the only remaining eye, was disappointing. Tho part of the growth could be seen to disappear, the arrest was only temporary and the eye had to be enucleated later when it was blind.

Davis reports bilateral glioma with only light perception remaining in the

best eye. He advised *selenium* treatment. The mother had lost another child with "cancer of the eye." **Jendralsky**, from Uhthoff's clinic, discusses treatment of glioma, a propos of seven cases. Primary radiation is useless, he believes, even in bilateral glioma after enucleation of the worst eye. The only place for primary radiation is in bilateral glioma, after enucleation of the worst eye. In one sided cases, it should be used in the orbit after enucleation. In one case, however, recurrence progressed tho radium had been used when there were no signs of extension.

Rush describes two cases of glioma in the advanced stages seldom seen in this country. In one, a boy of four, a red beefy mass was protruded 50 mm. out of the orbit, reaching from the midline of the nose past the outer wall of the orbit. No globe could be made out in the mass. Some glands on that side were broken down. The other eye was normal. The other case, a boy of two, was even more advanced, the tumor protruding 65 mm. from the orbit. In both cases, the orbit was eviscerated and radium used in the orbit. The first child was still living after two months, the second died in one month. Sections in case two showed that the extension outside the globe loses the characteristic structure of glioma as it begins to grow faster.

Siegrist reports a case (mentioned by Axenfeld in 1918) of a boy whose right eye had been enucleated ten years before for glioma, which was confirmed by sections. Two months later a tumor was seen in the left eye. At present, this appears about the same as when first seen ten years before and vision is normal. The report of this paper does not mention any treatment, and this is apparently a case of spontaneous retrogression of the tumor.

Comas gives details of a glioma family, of eleven brothers and sisters. Five had glioma retinae. The father died of carcinoma of the stomach. Only one of the children lived, after double enucleation. **Kennon** contributes to the influence of *heredity* in glioma. His

case, a boy of fifteen months, had unilateral glioma. The child's mother had had one eye enucleated for glioma when she was four months old, and died of mediastinal sarcoma. She had shown evidence of this when her baby was six months old, and probably had it while she was pregnant, which opens the question whether the malignancy could have had any causal relation to that of her child. **Story** reports a typical case of glioma.

Monauni contributes to the histology of glioma. His sections from a very early case, showed the epithelial origin of the tumor and the proliferation of glia in it.

TUMORS OF THE VITREOUS:—Frogé reports a man of 44 with a floating cyst of the vitreous. It had been present since youth, without causing inflammatory symptoms, and is considered as probably being of embryonic origin.

BENIGN TUMORS OF THE ORBIT:—Smith showed a child of three on whom he had operated at the age of three months for *angioma* at the inner angle of the orbit, by ligation. It now showed recurrence, the tumor filling the inner angle, causing partial ptosis, and protruding in the conjunctival sac. The danger of further ligations was discussed. *Cavernous lymphangioma* is reported by **Gradle**, in a girl of seven. The lower lid was bulged forward by a mass extending into the orbit, and a subconjunctival mass was seen. The globe was pushed up and out, and proptosed 2 to 3 mm. The mass was dissected out in toto. Sections showed it to be made up of cavernous spaces lined with endothelium, full of coagulated serum, the spaces being surrounded by lymphoid infiltration, with some true follicles. **Balbuena's** case, a child of nine months, had a large angioma extending onto the bulbar conjunctiva and upper lid to the forehead. It began as a small red spot on the upper lid two days after birth. Exophthalmos was present. Under radium the tumor had disappeared except for a small vascular nevus on the forehead.

Redslob saw a man of 55 with bilateral tumors of the orbit which had produced exophthalmos from birth. This had been progressing faster lately, and the corneas were suffering from exposure. Operation was refused. The tumors were considered as possibly lymphangiomata. **Cremer** reports cystic lymphangioma of the orbit in a boy of 11. A pea sized swelling of the lower lid had been present for a year, but had increased in size rapidly, following a blow with a stick, producing exophthalmos and ptosis. A slightly fluctuating tumor could be felt, and was removed in toto. It proved to be a cyst with its walls infiltrated with lymphocytes and full of vascular spaces.

Betti discusses bony tumors of the orbit, about 200 cases of which have been reported. His case, a woman of 36, had broken her nose in childhood, and for the past fifteen months had noticed a swelling in the left orbit near the root of the nose. Later severe pain developed. A slow growing, hard, immovable, conical mass was made out, with its base toward the apex of the orbit. It was removed easily from its origin on the lamina papyracea of the ethmoid bone. It was made up of a hard shell and spongy matrix continuous with the matrix of the ethmoid, and is considered an *exostosis*.

Lauber's case, a man of 37, had suffered pain in the head for the past few months, loss of vision and proptosis of L. and obstruction of the left side of the nose. There was choked disc of 3 D. L., and slight choked disc R. X-ray showed a dense shadow in the left ethmoid cells and the left orbit. The orbital wall was resected and an *ivory exostosis* removed with no recurrence after nine years. L. was blind from secondary atrophy. His second case had noticed exophthalmos for two years, and a hard tumor could be felt above the globe. X-ray showed a shadow in the orbit. Killian's operation was done, and a pedunculated *osteoma* was removed, having its origin in the ethmoid cells. **Paton** showed a case similar to this. In view of the ex-

tensive operation which he had found necessary in his last case, which involved the frontal lobe, he preferred to refer this case to a general surgeon for operation. **Cumston** reports an *osteoma* of the orbit.

Miller reports *dermoid* of the orbit in a girl of nine. Soon after birth, a growth was noticed under the upper lid, with several long hairs growing from it. Now there was ptosis, and a pinkish ovoid mass could be seen beneath the temporal portion of the upper lid, pushing the eye down and in. It was removed and proved to be a dermoid cyst, containing a long mass resembling the crown of a deciduous canine tooth and some hairs. The cosmetic result was good.

Luz saw a case of sphenoidal *meningocele* in a child of two, simulating a new growth. A lump the size of an orange was present in the left inner angle including the whole side of the face down to the chin. The child died of meningitis two days after it had apparently extended into the orbit. An autopsy, a greatly enlarged sphenoidal fissure was found, allowing the membranes to prolapse. **Bruntiere** reports *lymphocytoma* in both orbits, proved by section. Radium was used.

Marbaix and **G. Van Duyse** classify as *pseudoblastoma* tumors appearing as true neoplasms, but proving not to be such, and apparently disappearing on exploratory operation. Their case, a girl of eleven, one year before had developed a pimple of the lower lid which did not suppurate. In eight days exophthalmus developed, with paralysis of the 3rd nerve, and of accommodation. This remained the same for six months, when symptoms increased rapidly. At operation, no tumor could be felt, except that the posterior part of the lacrimal gland was somewhat thickened. The blood showed 44% lymphocytes, but no leucocytes. Sections showed a lymphocytic infiltration about the gland with some pseudofollicles, and the condition is considered a hyperplasia of preexisting lymphoid

tissue with some inflammatory changes. The literature is discussed.

Hydatid cysts of the orbit are reported by **Villarin**, **Carrasco**, and **Solares**, the latter contributing a very complete monograph on the subject, with four case reports. (See p. 446.)

Gonzalez gives a complete report of a case of *mycotic tumor* of the orbit. His patient, a woman of 21, had noted for several months trouble in moving and opening L. E., progressing to complete loss of movement. There was a swelling behind the left ear interfering with mastication, slight exophthalmos and divergence of L. E. and ulceration of the cornea from exposure. Tuberculin tests were negative, and the condition grew worse under mercury treatment. An incision in the edge of the orbit allowed the escape of only a few drops of pus. After being lost sight of for four years, she returned with all symptoms worse, blind in the eye, and with lesions of the sternum and parietal bone. Smears of pus from these lesions showed an organism resembling *Sporothrix*; which, tho cultures were not available, was considered probably *Sporothrix Beurmanni*. Under K. I. in large doses, the ulcers rapidly healed and the exophthalmos had disappeared in six months. **Quervain** reports *leiomyoma* of the orbit.

MALIGNANT TUMORS.—**Rumbaur** reports *lymphosarcoma* in the left orbit of a man of 40. Symptoms had been noticed for two months, and proptosis had become 10 mm. Tissue removed for section at the edge of the orbit did not reveal the nature of the growth, and the orbit was exenterated. Its origin is considered to be embryologically displaced foci of lymphoid tissue in the orbit, or possibly from the lymphoid tissue of the lacrimal gland or the tarsus. **Rochon-Duvigneaud**, **Mawas** and **Lomon** report a case in which the orbital tumor was much decreased in size by X-ray treatments. It was then found to have involved the ethmoid cells, and radium was to be used in its further treatment. Biopsy material showed *lymphosarcoma*.

Hansell's patient showed an orbital tumor of 2 years' duration, which X-ray and radium treatment have only been able to keep from rapid growth. It is considered probably a sarcoma. **Agatston** saw a man of 64, who had had pain in the face for three months, and rapidly increasing proptosis for three weeks. There was choked disc and V was 20/70. X-ray apparently showed involvement of the antrum. It was considered probably sarcoma. **Cayce** removed a swelling over the right eye of a child which had existed since birth, and was considered an angioma. Sections, however, showed it to be a small round celled sarcoma. **Silva** reports *osteosarcoma* of the orbit; and **Wessely** *neuroblastoma*.

Epithelioma of the orbit is reported by **van Duyse** and **Aubineau**. A tumor was removed from the orbit of a man of 58, which proved to be a *fibromyxoma*. One year later it recurred, was removed, and was reported to be a *myxoepithelial tumor*. A year later a further recurrence was removed and proved to be an *epithelioma*. **D. van Duyse** now reports five new cases of epithelial tumors of the orbit, diagnosed by sections. One was composed of *fibromyxomatous tissue* and *epithelium* at the first operation, but the recurrence showed only *epithelium* with an *alveolar arrangement*. Another was a *fibrochondroepithelioma* starting in the lacrimal gland. A third was called *anaplastic fibroepithelioma*, and the fourth and fifth *adenocarcinoma*. He believes epithelial tumors are not uncommon in the orbit, and should be watched for developing malignancy.

Finnoff discusses completely the literature of carcinoma of the orbit, and reports a new case. Most of the reported cases were metastases from carcinoma of the breast, and most had reached the orbit by extension from growths in the choroid. Only seventeen have been reported in the orbit without involvement of the globe, lacrimal gland or skin of the face. His patient was a man of 44, with loss of vision and proptosis R. existing for three months, preceded for four

months by diplopia. There was no evidence of malignancy elsewhere, and the abdomen had been opened for an operation the year before, without anything suspicious of malignancy having been reported. At operation, the globe was removed, and the tumor was seen to fill the apex of the orbit. Five separate encapsulated tumors were removed, which proved on section to be scirrhus adenocarcinoma. Later, X-ray demonstrated multiple tumors in the lungs and probably also in the spine, so that the tumor in the orbit is considered probably a metastasis.

TUMORS OF THE LACRIMAL APPARATUS.—**McMullen's** patient showed a *cyst* at the upper edge of the orbit, adhering to the roof of the orbit. It evidently arose from the lacrimal gland. Puncture was suggested to clear up the diagnosis. In the discussion, **Lister** describes a similar, but larger cyst, which burst when a Krönlein operation was done, and which did not recur.

Cysts of the lacrimal sac are discussed by **Kubik**. In two cases a bluish tumor presented over the sac, which did not evacuate on pressure. The lacrimal duct washed thru easily. At operation, the cyst was found to be entirely separate from the sac and was extirpated.

Marsh reports atypical *Mikulicz' syndrome* in which the first sign was tumors of both lacrimal glands. Sections showed the changes of tuberculosis but no bacilli. **Grieg's** case was more typical clinically, with tumors of both lacrimal glands, submaxillary glands and one parotid for about a year. Later both sublinguals and the other parotid became swollen. The blood showed a lymphatic form of *pseudoleukemia*, however, and prompt cure was effected by the X-rays.

Crawley reports a massive growth in the orbit of a girl of 23, producing exophthalmos. By a Krönlein incision the mass was removed, and good motility of the eye obtained. Sections showed *endothelioma* with some myxomatous changes. Its origin was considered to be the lacrimal gland.

Howard reported a mass in the orbit restricting ocular movements, developing in five months. It recurred four months after extirpation in spite of X-ray treatment, and the orbit was eviscerated and cauterized deeply. It had not recurred after four and a half years. Sections showed alveolar *carcinoma*.

Giraud saw a case of sarcoma in the region of the lacrimal sac. The patient was a man 75 years of age. He had been treated for erysipelas and dacryocystitis. When seen by the author, 15 months after the onset, a large ulcer in the region of the lacrimal sac extending to the opposite palpebral commissure was noted.

TUMORS OF THE OPTIC NERVE AND SHEATHS:—**Cohen** and **McNeal** report in detail a case with *metastasis of carcinoma* into a preexisting tumor of the nerve. The patient, a woman of 45, had lost the sight of L. 2 1/2 years before; and 16 months before she had undergone breast amputation, and carcinoma was found by sections. For the past three months she had shown the symptoms of brain tumor, with loss of vision in R. Ophthalmoscopic examination disclosed choked disc R., and marked atrophy L., without any choked disc. She died eight days after admission and postmortem showed multiple carcinomatous nodules scattered thru the brain. Around the left optic nerve, was a large tumor which proved to be a dural endothelioma of the nerve sheath, with nodules of carcinoma infiltrating its lower part. The cells of these nodules were similar to those in the brain, and the tissues originally removed from the breast.

Reese describes successful removal of a primary intradural tumor by a Krönlein's operation, with preservation of good motility of the globe. The exophthalmos of 6 mm. entirely disappeared. Sections showed a *myxoglioma* which had apparently originated in the glia cells just beneath the nerve-sheath. (Literature). **Rubendall** describes a similar case in which the globe was preserved, and the tumor removed in its capsule. **Blair's** case was oper-

ated by Krönlein incision with relief of the exophthalmos and squint. The tumor was composed of glia and fibroblasts. **Fleischer** and **Scheerer** report five cases, all four in which sections were made proving to be glia tumors, which showed the same tendency to mucoid degeneration. All were typical as to site and size.

Scott and **Schmidt** report an intradural tumor in which the eye was removed with the nerve. The tumor showed two types of glia cells with myxomatous degeneration. **Swift** showed a 16 year old girl with proptosis and poor vision of R., for several months, in which an optic nerve tumor was diagnosed and Krönlein operation recommended. **Clopton** saw a child of three with exophthalmos since the eighth month. Glioma of the nerve was removed by incision at the lower edge of the orbit, and was replaced by fat with good cosmetic result.

Sidler-Huguenin contributes a case of *endothelioma* of the papilla. In a child of three, a tumor the size of a cherry stone was seen on the papilla. Sections showed an *endothelioma*, composed of vessels whose endothelium had proliferated. He thinks it was derived from the hyaloid vessels. In **Reid** and **Sattler's** case, the extradural *endothelioma* was removed without resecting the orbit, with preservation of the globe. **Holmes** reports the case of a woman of 40 who had been blind for three months with marked choked disc when seen. Postmortem showed a large glioma of the frontal lobe, and a smaller glioma, probably a metastasis from the first tumor. It was this tumor which produced blindness, and not the choked disc, **Holmes** thinks.

Christin and **Naville** report a case with multiple *neurofibromata* affecting especially the nervous system. His patient, a man of 31, had become deaf 22 years before, and had been losing vision for nine years. He showed paralysis of the facial nerve, hemiatrophy of the tongue and bilateral choked disc. At autopsy, several dozen tumors were found in various cranial nerves, in one

breast and in the pelvis. Sections of the cranial tumors showed them to be fibrosarcomata with calcium deposits and psammomata. His second case, a man of 32, had been blind in L. E. since he was seven years old. Now choked disc was present with vision 1/10. The right eye showed proliferation of the connective tissue of the retina and nerve. A third case showed a condition of fibrosis extending from the nerve out into the retina in both eyes. Both these latter patients had clinical evidence of multiple lesions of the cranial nerves. The author believes a "teratoid" disposition of the tissues explains the multiplicity of these tumors in certain systems.

TUMORS OF OCULOMOTOR NERVES.—**Mancini** reports a case of an eleven year old boy with bilateral ophthalmoplegia appearing in the course of what was apparently bronchial pneumonia. Postmortem showed a lymphosarcoma of the mediastinum with metastases at the base of the brain including both third nerves. Sections showed round celled sarcoma.

TUMOR OF BRAIN.—**Artom's** patient, a boy of fifteen, had suffered for three months with severe headache and poor vision progressing to blindness of the right eye, with very poor vision of the left eye. There was exophthalmus in the right eye, edema of the right side of the face, and total ophthalmoplegia right, partial ophthalmoplegia left. Postmortem showed that a small round celled *sarcoma* in the right temporal lobe by pressure on the cavernous sinus was producing the ocular symptoms.

PATHOLOGY OF TUMORS.—**Jackson** emphasizes the general character and importance of malignancy no matter of what special type; the need of removing any foci of cells that have "gotten out of line of functional usefulness." He gives instances of malignant change in benign tumors. He emphasizes the value of radium in malignancy, especially after surgical removal.

Birch-Hirschfeld discusses melanotic tumors in general. Pigment in a tu-

mor does not always mean that the tumor is melanotic, as especially in vascular tumors this may be iron pigment. He shares Ribbert's belief that melanomata of the skin, conjunctiva and choroid, are all chromatophoromata, developed from cells essentially identical.

TREATMENT OF TUMORS OF THE EYE.—**Jendralsky** (see Tumors of Retina) reports disappointing results from the use of radium in sarcoma, especially of the lids and orbit. **Heyerdahl**, in a discussion of radium treatment for tumors in general, mentions treating two cases of epithelioma of the limbus and several cases of carcinoma of the lids with good results.

In discussing the relative merits of radium and other methods employed in the treatment of malignant tumors in general, **Clark** reports and publishes illustrations of several cases of malignant tumors of the eyes and orbit. In sarcoma and glioma, the author obtained splendid results by using radium needles. A case of basal celled epithelioma of the eye lids cleared up after one treatment by electrocoagulation, and no recurrence was noted after 3 years. A cure of sarcoma of the sclera, after desiccation treatment, is also reported.

SUMMARY OF THE LITERATURE ON TUMORS.—The literature of the year is notable for the number of cases in which tumors were treated by X-ray and radium. In glioma, some authors have used it in the most recently af-

fected eye after enucleation of the first eye, and some early reports give encouragement in this method, though Knapp's report and summary is less encouraging as to the ultimate outcome. Jendralsky is also a little skeptical as to radiation except under certain definite indications and usually after radical surgery. Several cases of hereditary glioma and glioma families are reported.

Cases of optic nerve tumors with successful operation both with and without resection of the orbit are fairly often reported, and a good deal is added to our knowledge of their histology.

Several interesting cases of lymphoma appearing both subconjunctivally and deep in the orbit are reported, the notable thing about most cases being their prompt response to X-ray.

The histology of a condition not previously described, cholesteatoma of the retina, is reported by **Offret** and **Pascano**.

Of interest is the report of **Meesman** describing his observation of an early choroidal tumor with the slit lamp. It was apparently possible to make a diagnosis of melanosarcoma by this means and there can be no doubt that further observation with the slit lamp will add to our knowledge of the early pathology of tumors.

Fuchs' lectures which deal with tumors of the eye were published by **Marin Amat**.

Ocular Parasites

JAMES M. SHIELDS, M.D.

DENVER, COLORADO.

This section carries the literature from January 1921, to October, 1921. For previous references see Vol. 16, December, 1920, p. 328.

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DIGEST OF THE LITERATURE.

MYIASIS:—Behr has reported the case of a boy, seven years of age, who developed a circumscribed phlyctenular irritation with swelling of both ocular conjunctiva and cheek. Later a nodule developed on the sclera and with it such severe inflammatory symptoms that either glioma or tuberculosis was suspected and the eye was removed. The author states that examination revealed the larva of a fly which he thought to be of the *Hypoderma boris*. Intense choroiditis and almost complete detachment of the retina had resulted from the movements of the parasite.

The literature of this affection is reviewed and the following summary

given:—"The larvae of *Oestrus hypoderma boris* which enters the body of warm blooded animals in summer, or beginning autumn, for hibernation, may in rare cases also invade the human eye, so far observed only in children, most likely on account of their more tender sclera. Generally they are deposited in the surroundings of the eye and wander to the eyeball, the outer coats of which they pierce.

They do the least harm if they enter the anterior chamber, in which location they are easily diagnosed and extracted (In this location the condition is known as *ophthalmia interna anterior*). If the larva penetrates the eyeball further back (*ophthalmia interna*

posterior) its migration may be prevented by circumscribed phlyctenular irritation and later by the development of a scleral nodule. This is the last moment at which the eye may be saved by incision of the nodule and extraction of the larva. After its entrance into the interior of the globe, opacities of the vitreous and detachment of the retina at once develop."

Fulleborn states that according to **Portschinsky** the *Oestrus* fly injects its larvae into the nostrils of sheep without settling, and that, in 1911, **Portschinsky** discovered the larvae of *Oestrus ovis* in its youngest state in the eye of a human. The author quotes **Prates** as writing from the island of Sal, of the Cape Verde group, that fly larvae are found in the eyes of natives, as well as in the nostrils of goats and sheep, and that they occasionally lodge in the pharynx and nose causing coughing and sneezing. The natives of Sal seek to guard themselves against flies by smoking and chewing strong tobacco. Larvae of the eyes are extracted, those of the pharynx are treated with hot olive oil and with highly spiced foods.

Prates is of the opinion that ophthalmomyiasis in the Cape Verde Islands is traceable to flies (*Oestrus ovis*). He states that the cause of human oculomyiasis provoked by oestrides is generally *Phinoestrus nasalis*, a parasite habitual to equines, or *Oestrus nasalis*, a parasite habitual to goats and sheep. He adds that *Rhinoestrus nasalis*, while in flight, can deposit eight to fifty eggs in the eye of a horse, or other equine, or accidentally, in a human eye. The *Oestrus ovis* is able to deposit larvae in the nostrils of goats and sheep, or accidentally in those of men and dogs.

Wright and **Patton** have reported the case of a Hindu woman, thirty years of age, who came to the Government Ophthalmological Hospital, Madras, in November, 1920. The supra-orbital and intraorbital regions, from the external angular process on the left to a little beyond the midline on the right, was represented by a gutter filled by mucopus and sloughing ma-

terial filled with maggots. There was extensive destruction of this area with involvement of the frontal sinuses above, the ethmoids and nasal fossae below, and the apex of the right orbit posteriorly. The dura was not exposed. Both eyeballs were proptosed and pushed laterally, forming the external boundaries of the ulcer. Both corneae were covered by the drooping upper lids, which were very edematous and hanging down because of the attachments being severed above. There was no ulceration of the right cornea but there was a large central ulcer on the left.

In all eighty mature larvae of the *Chrysomya bezziana* (Villeneuve) were recovered from the sloughing area. This fly deposits its eggs in the diseased tissues of man and animals, and is the specific myiasis producing Calliphorine of India. The author states that the larvae of *bezziana* do not penetrate bone and cartilage, but that these tissues are destroyed by the action of bacterial ferments. In the case referred to, the local treatment consisted of cutting away of sloughs, irrigation with permanganat solution, application of turpentine and the removal of the larvae. Later frequent irrigations with chlorin solution and loose packing with iodoform gauze were used. Upon admission to the hospital, vision of the right eye was reduced to counting fingers at one foot and in left to light perception. The prognosis as to life was said to be good but vision for the left eye hopeless because of the large ulcer and the injury to muscle attachments. The author was of the opinion that useful vision might result for the right eye.

TREMATODA.—**Suemori** has investigated in animals infection by the lung *distoma* which produces tumors in the lids and orbit. When worms were placed in the conjunctiva, they entered the ciliary vessels and so reached the uveal tract, lids and orbit, where they produced their lesions. Lesions of the breast and lungs occurred later.

CYSTICERCUS.—**Mazza y Tiscornia** report the removal of a cysticercus from

the subconjunctival tissues of the lower fornix of the left eye in a girl of fifteen years. A complete description of the tumor, and of the microscopic sections, is given. The authors state that cases of cysticercus are becoming more and more frequent in the Argentine, and advise others to be on the lookout for them. **Burnier**, in 1918, presented a twenty two page tract on Ocular Cysticercus. **Nette**, in 1919, wrote his thesis on Cysticercus in the Vitreous. (See also p. 440.)

Uthhoff has reported four cases of subretinal cysticercus in soldiers, and states that because of suspended or irregular meat inspection, these cases have been more frequently observed during the war. In the first case, after removal of the cysticercus, vision improved from counting fingers at 30 cm. to counting them at 1.5 meters. In a second case light perception was preserved, while in a third an adherent, thick capsule, within a subretinal hemorrhage, complicated the condition but the cysticercus was finally removed by means of a loop, a good deal of vitreous being lost. In the fourth case, the cysticercus was near the nasal border of the disc and, the eye being without irritation, operation was postponed.

Zaniboni has reported the case of a soldier who had eaten raw meat in Russia, had developed a tenia in the intestinal tract and expelled it after treatment. Later a cyst developed in the upper and outer part of the vitreous of the left eye. Night blindness was the first symptom complained of, but later fogging by day was noticed. In ten months from the beginning of symptoms, the eye was blind but there was no pain at any time. Examination with the ophthalmoscope showed the proglottides of *tenia solium*. The author expected to remove the cyst a few days after this report was made.

Pillat agrees with **Uthhoff** as to the increased number of cases of cysticercus during the war and cites the case of a soldier, twenty-nine years of age, who was taken ill with *trichinosis* after eating raw ham. The patient had a temperature of 40°, vomited and had

diarrhea, and developed a swelling of the eyelids, which subsided after ten days. A year later he visited an oculist who made an ophthalmoscopic diagnosis of subretinal cysticercus. Showing thru the retina, in the center of the fundus, was a greyish white mass in which the undulating movements of the cysticercus could be seen. Sixteen months after the first symptoms were noted, and two months after the patient was seen at the clinic at Warsaw, the cyst was removed. The author describes the operation in detail, stating that *tenia solium* was the specimen recovered.

Mullen reports a case of intraocular cysticercus, and states that the bladder worm may be seen in the eye either subretinally or in the vitreous. His diagnosis was made with the ophthalmoscope, the parasite being seen floating in the vitreous of the left eye. **Cramer** reports a case of intraocular cysticercus in a sergeant twenty-six years of age. The patient had had a previous diagnosis of optic neuritis and retinal detachment. The author describes his method of localizing the cyst and describes his operation in detail.

SPARGANOSIS.—**Motais** reported cases of sparganosis of the eyelids and orbit. One patient was a man 25 years of age, an inhabitant of Huè. The eyes had been red and the lids edematous for many years. The lower lids of both eyes were edematous and contained small tumor masses. Both orbits were involved in the process, and the motion of the left eye was limited. Several specimens of the sparganum were removed from the lids and orbit. The author entered the right orbit thru a Kroenlein resection of the orbital wall, but was unable to explore deeply because of the difficulty of dissection of the altered orbital tissue. Several of the worms near the orbital wall were removed, and a solution of cyanid of mercury was injected into the orbit. The patient improved after several injections of cyanid into the orbit and neosalvarsan into the veins.

The author reports a second case which was diagnosed sparganum from the clinical appearances. The patient was 11 years of age. The edema and tumor were located in the lower right eyelid. A single parasite escaped with a little serous fluid on opening a projecting nodule of the tumor. This parasite, *sparganum mansonii* (Leuckart), is still unknown in adult form. It has been classified in the family dilotriocephalides, allied to the tape worms. The larvae appear to vary in

ers called the disease "Coast Erysipelas" and that they thought the tumors independent sebaceous cysts, the eye symptoms being due to some other cause. He credits Robles with having proved the true etiology of the condition, and states that the disease exists endemically in a strip of land, between two and four thousand feet in height, along the Pacific coast of Guatemala, and that it is believed to exist in the neighboring parts of Mexico and Salvador.

The author makes careful comparisons between the previously described *Onchocerca volvulus*, Leuckart, 1893, and the new species of *onchocerca*. He describes extraocular and ocular manifestations, and the clinical forms of the disease. He thinks the intermediary host to be taones, or glosinas, bloodsucking insects, and recommends in the way of treatment the following: (1) treatment by operation of all persons having the disease, (2) building of dwelling houses as far as possible from the banks of streams, in open places, (3) introduction into houses of potable water for domestic purposes, (4) clearing of banks of streams which are near cultivated land.

Charles reports the case of a Hindu, male, forty-five years of age, who eight months before coming to the clinic had sudden pain in the right eye, followed by a swelling on the inner and lower side of the globe. The pain subsided during the cool nights and increased during the day. The swollen area was very painful and red, the pupil was dilated and there was increased lacrimation. A filaria, apparently a female, measuring 33 mm. in length by 2 mm. in thickness, was removed under cocain. When the measurements were taken the specimen had been in alcohol for some hours and had shrunken. The author states that the normal hosts of *filaria conjunctivae* are the horse and the ass. **Sewell** gives a description of the specimen recovered in the above case.

Parodi and **Bonavia** report the removal of a filaria from the right eye of a woman sixty-two years of age. When first seen she had been having ocular symptoms for four days, and the parasite could be seen coiling and un-



Fig. 18.—Patient suffering from sparganosis (case of Motais).

size from 10 to 35 mm. in length with a head 2.5 by 3 mm., and body less than 2 mm. in breadth. The specimens originally described by Manson from China were much larger. They were obtained from beneath the peritoneum. (See also Oph. Y. B. v. 15, 1918, p. 267.)

FILARIA.—**Calderon** used for his doctorate thesis the subject *Filaria Onchocerca*. The paper is in print and covers 107 pages. **Pacheco-Luna** refers to a paper written by Mr. W. T. Fee, corrects some of the statements of Mr. Fee and defines *Onchocercosis* as a "new disease characterized by subcutaneous tumors, well limited, containing a species of *Filaria onchocerca*, the principal symptom being disturbance of the eye." He states that earlier writ-

coiling beneath the conjunctiva. Upon removal it was found to be 11 mm. in length and it kept up its movements for three days, at which time it was killed in alcohol. The blood of the patient showed no microfilarias, and the parasite is said to be one not before described.

Gamble has exhibited a specimen of *filaria loa* and has reviewed the literature on the subject. **Begle**, in a case report of a patient from whom he had removed a subconjunctival filaria, makes the following statement: "There are on record a number of persons in the United States infested with *filaria loa*, possibly nine or ten in all. Some of the records are fragmentary. Missionaries returning from the west coast of Africa, where the parasite is endemic, have been the usual hosts of this nematode." The author describes the symptoms complained of by the patient reported in his paper, describes the removal of the parasite from beneath the ocular conjunctiva, states that there was present an eosinophilia, and estimates that the infection occurred about twelve or fifteen years before he saw the case. Three years after the operation above referred to microfilarias were still to be found in the peripheral blood upon every examination. The patient gave definite history of having had a Calabar swelling.

Low and **O'Driscoll** have written on *filaria loa* infection and described the general symptoms. They also deal with the pathogenesis of Calabar swellings and with the diagnosis. The diagnosis is made by (1) finding of the adult worm in the eye, (2) finding of the microfilarias in the peripheral blood, (3) definite history of Calabar swellings, and, (4) eosinophilia in persons from endemic areas. Eosinophilia, varying from twelve

to twenty per cent, is said to be a very constant symptom, and upon it alone diagnoses have been made. The authors refer to the periodicity with which *filaria loa* and *filaria bancrofti* appear in the blood, and to the inversion of this periodicity. They cite a case and tabulate the results obtained from the administration of antimony tartrate.

Fischer has written on conjunctival parasites and refers to an article which appeared in the China Medical Journal, in 1917, concerning parasites in the conjunctiva of both humans and dogs. In this article the first case is reported by Stuckey, who removed four worms from the fornix of a twenty-five year old Chinaman. The patient had been suffering from the presence of worms in the conjunctiva for about six months, according to his own statement. Biggins had removed similar worms from the conjunctiva of a hunting dog in China. The worms taken from humans and dogs were alike, except that those from humans were of greater size. Fischer had obtained specimens of worms from the eyes of dogs and describes them in detail. He states that those removed from human eyes are probably identical with the previously described *filaria lacrimalis* (Gurlt), and with *filaria palpebraris* (Wilson), adding that the nomenclature of parasites is so subject to change as to make classification almost impossible. (See also, O. Y. B. 1917, v. 14, p. 235.)

GENERAL PAPERS.—**Santos Fernandez** has written an interesting paper entitled Blindness in Cuba caused by Parasites. **Joyeux** has mentioned the various parasites which affect the eye and reviewed the clinical changes which are characteristic of each; and **Osada** writes on orbital parasites.

Injuries

THEODORE B. SCHNEIDEMAN, M.D., F.A.C.S.

PHILADELPHIA, PA.

This section carries the literature from October, 1920, to October, 1921. For previous references, see O. L. v. 16, 1920, p. 287.

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DIGEST OF THE LITERATURE.

BURNS.—In Bane's case, the inner canthus of the left eye had received a hot welding compound of borax and iron filings. The external tissue over the inner half of the eyeball, including the caruncle and lid margins, were burned white. A few scales of metal were removed from the lower cul de sac. Marked contraction of scar tissue in the affected area of bulbar and palpebral conjunctiva resulted. The sight was apparently unaffected.

In Finnoff's case, the right lower lid had been burned in 1916 by a piece of hot steel. At the end of a year, the wound was still not entirely healed, and the ulcerated surface was curetted and otherwise treated; the surface healed and remained so for 6 months, when it again broke down and the ulceration extended later to the ala of the nose. In December 1920, there was a large ulcerated area involving the cheek and the right side of the nose; the lower eyelid had been entirely destroyed, and the ulceration extended back under the globe and into the maxillary sinus.

Enucleation and evisceration of the orbit, with removal of epitheliomatous tissue from the nasal sinuses, was refused. 25 milligrams of radium were applied to the *epithelioma* for a period of four hours over each area, until all accessible parts of the growth had been treated. In two weeks marked improvement was noted, and the ulcerated areas were filled with epithelium and scar tissue, but recurrence in the orbit and nose was expected unless surgical intervention, followed by radium application, was permitted.

Schwenk observed two kinds of burns in the same patient: a superficial one of the left eye, the other a deep burn of the right. Both the bulbar and palpebral conjunctivae were excoriated. The reporter prefers to treat these cases with irrigations of cold sterile water instead of oil; diosmin is contraindicated in the acute stage.

INJURIES FROM X-RAYS.—In Velter's case repeated radioscopy and radiography were followed by alopecia and new growth of the hair at the expira-

tion of 2 1/2 months. **Frenkel** observed a veritable epidemic of the same accident. The cause is undoubtedly the use of rays not filtered by a plate of aluminum. **Coutela** publishes a series of similar occurrences. **Terson** asks whether alopecia of the eyebrows and cilia (outside of the intentional action in intersuperciliary hypertrichosis had been noted from radiography.

Kümmell observed after Roentgen radiation diminished sensibility of the cornea, in one case to such an extent that the cornea could be indented with out eliciting defensive movements. There was also diminished sensibility of the other branches of the 5th nerve. Twice the intraocular pressure was transiently increased.

Kümmell then relates the further facts of a child, aged 3 1/2 years, with glioma of the retina, reported in 1918 at Heidelberg. Roentgen rays had undoubtedly very much influenced the glioma as shown by the recession, reattachment of the retina and recurrence of a slight pupillary reaction to light. But new nodules occurred, which yielded to radiation, leaving only one at the last examination. The child, however, died after a month from pneumonia. An autopsy was not granted. Radiations of glioma relapses in the orbit were of no avail in **Kümmell's** cases.

In **Birch-Hirschfeld's** case, a man, aged 28, who had lost his left eye seventeen years previously, was treated with Roentgen rays for ten days on account of choroidal tumors of his right eye. After two weeks the eye was inflamed and showed numerous small infiltrations of the superficial and deep layers of the cornea, and indentations and sausage like dilatations of the conjunctival vessels. Vision reduced to fingers at 2 1/2 mm. After three weeks, the infiltrations were absorbed. Vision rose to 1/1. The same phenomena occurred after a further period of treatment, with a corneal ulcer after the last one. The tumor seemed to be smaller.

The second patient, a man, aged 61, was treated by a radiotherapist with

Roentgen rays for a cancrroid of the upper lid, without protecting the eyes. The cancrroid was cured, but the eye had become very much inflamed, painful and blind, so that it had to be enucleated. It revealed absolute glaucoma, deep excavation, atrophy of the optic nerve, iris and ciliary body, obliteration of the sinus, marked changes of the epi-and intrabulbar vessels and of the cornea, identical with the anatomic picture the author had found formerly in his experiments upon animals. He warns against Roentgen rays in glaucoma of seeing eyes, as this might be aggravated by the resulting vascular changes, and also in other affection, e. g. pannus, while he considers their application in painful blind eyes with hemorrhagic glaucoma, as recommended by **Hessberg**, as justifiable.

INJURIES BY ELECTRICITY.—**Amaurosis** from lightning is rare. Thus an exhaustive study by **Van Lint** presented to the Belgian Society of Ophthalmology, Nov. 1909 could find but three cases since 1843. **Depas** reports the following case: a young woman being in her kitchen during a violent thunder storm, with the window open, experienced the impression that lightning was passing thru the room when she suddenly became blind; she collapsed without, however, losing consciousness, and was found in this condition shortly after. There were no appreciable lesions except two superficial red spots upon the upper part of the breast and arm; they resembled urticaria and disappeared in a short time. She was seen by the reporter two hours after the accident: there was such intense photophobia that examination was difficult. Blepharospasm was so severe as to be uninfluenced by cocain: ophthalmoscopic examination was impossible. The examiner could only discover slight hyperemia of the conjunctiva and that the pupils, somewhat contracted, reacted normally. Vision was almost nil; there was a red cloud before the eyes, thru which the test card could be distinguished as an obscure whitish surface. Nevertheless,

the presence of the luminous reflex authorized a favorable prognosis.

Two days later, there was not only no improvement, but the sight was even worse; pupillary reaction still normal. An interesting fact is that during these two days very intense ocular and periorbital pain, with cephalalgia as to prevent sleep, had appeared. Three days later amelioration began; ophthalmoscopic examination failed to show the slightest trace of any lesion. From thence onward, improvement was rapid with perfect restoration of the sight three weeks later, with normal fields. A first explanation of the loss of vision would ascribe the same to *hysteria*, but in view of our entire ignorance of the intimate mechanism of the act of vision, it is possible that mechanism may have been paralyzed for a period without alteration of the conductivity of the nervous fibers. Another conclusion from this case is that independent of its visual properties, the retina also possesses sensation, otherwise it would be impossible to explain the intense pain provoked by light while vision was absent, and there was no external lesion capable of explaining the intense photophobia present. To this same sensory property may also be attributed the hyperthesia to light, which becomes a truly painful sensation in many persons exposed to intense light without the presence of any objective lesion.

INJURIES FROM IRRITATING GASES.—**Brunetière's** paper suppressed by the censor during the war, was published in 1920. All his cases resulted from gas shells and not gaseous clouds. Three kinds of shells appear to have been in question: First, those having an odor of burnt chocolate; second, those having an odor of garlic and mustard; finally, those which upon exploding gave out no characteristic odor. Most of those affected were not wearing their masks at the moment of explosion; they replaced them immediately after, but the deleterious effects of the gas were not prevented thereby. Of the 14 individuals examined at intervals of a few hours to five days, the ocular lesions were in different stages

of evolution; 3 presented superficial burns of the face and lids with no lesions of the eyeball and conjunctiva; the remaining eleven were affected with very painful ocular manifestations. A few instants after the explosion, the wounded felt an unpleasant sensation of pricking, which soon gave place to lachrimation and intense burning; the patient was unable to open his eyes and had frequently to be led. There was intense photophobia and blepharospasm, with retention of the tears and at times even entropion; almost all complained of headache. Examination a few hours after the injury revealed that the gravity of the ocular lesions did not correspond to the pain; there was edema of the lids, regularly limited to the ciliary margin; the cornea appeared intact, but there is no doubt that epithelial exfoliation of that membrane can alone explain the pain and blepharospasm, altho the corneal lesions could not be discerned with the means at disposal; it would be interesting to make the examinations with the corneal microscope or fluorescein; in recent cases there was hardly any pericorneal injection. The ocular disturbances appeared to be limited to the conjunctiva, particularly of the inferior cul de sac and not, as might be supposed, to the palpebral aperture. A certain number of cases presented marked miosis with slowness of the light reflex, and that in spite of repeated instillation of cocain. All cases rapidly recovered. Treatment consisted in cleansin gthe cul de sacs and easing the pain; the former is best accomplished by extensive lavage with solution of bicarbonat of soda. The pain is combatted by very weak solution of cocain 1/1000, or by an ointement containing the drug. Cold compresses, frequently renewed, gave such a degree of relief that the patients themselves would frequently ask for such applications.

Vinsonneau, Bron and Putot prepared a paper upon ocular injuries from gas, in 1917; this paper was also suppressed by the censor and was now published in 1920. Three varieties of

gas were successively employed by the enemy, the noxious effects of which progressively increased in severity. The action of the first caused congestive phenomena on the part of the mucous membranes and deeper organs; that of the second manifested itself in burns of the tissues and a general intoxication of the organism; the third presented symptoms which might terminate in suppuration or sloughing. The effects upon the eyes showed progressively increased gravity from the first to the third species of gas. The ocular lesions were generally quite tardy in making their appearance—from 6 to 24 and even 36 hours after exposure. The inflammatory phenomena showed considerable improvement at the expiration of 12 to 15 days; recovery was usually complete after 15 to 20 days of rest and treatment. Besides the immediate or direct effects of the gas upon the integument and organs, interesting cases occurred of endogenous intoxication analogous to the effects observed in some of the contagious diseases. The progression noted in the gravity of the lesions must have corresponded to increased toxicity of the noxious gases; the latter accordingly must have been some new chemical substance, or a modification of one previously employed or a mixture of several gases.

In a study of ocular lesions from vesicating gases of the Yperite type (sulphid of ethyldichlorid) **Beauvieux** divides its action upon the apparatus of vision into direct, local, (lesions of lids, conjunctiva and cornea) and indirect (alterations of the retino-choroidal vascular system). The lesions of contact usually involve lids, conjunctiva and cornea simultaneously. The conjunctival lesions are either a simple conjunctivitis, characterized solely by vasomotor disturbances; and burn of the conjunctiva with or without involvement of the cornea; such burns are uniformly accompanied by serous infiltration of the lids and submucous cellular tissue, mild or severe, the latter closely simulating purulent oph-

thalmia of adults. All forms are liable to repeated relapses.

The indirect lesions are due to intoxication thru the vascular system from prolonged exposure to the gas. They consist of vasodilatation of the retinal venous system, passing on to papillary hyperemia in the severer cases. The retina itself always escapes; hemorrhages do not occur.

Bellavia reports ocular lacrimation from gas, **Gutmann** gas injury to the eyes; and **Harvier** reports myasthenic syndrome following poisoning with war gas.

CHEMICAL INJURIES.—**Desprets** remarks: that burns by chemical substances are usually extensive, sparing no part of the eye. The prognosis is accordingly extremely doubtful. Where the conjunctiva shows intense red ecchymotic color, and if the globe is also involved presents corneal lesions without, however, any trace of necrosis of the conjunctiva, the prognosis is relatively favorable. If the eye shows no reaction to the caustic agent, while the conjunctiva is pale, milky, without episcleral injection, and if eschars form, even with apparent integrity of the cornea, the prognosis should be extremely reserved, still more so if the cornea has entirely lost its sensibility. In these cases the corneal lesions appear late, and infectious complications frequently arise, like those in neuroparalytic keratitis. In a certain number of cases, unhappily too limited, the aspect of the early lesions and the presence of pseudomembranous deposits covering the cornea, may give rise to grave apprehensions; nevertheless, after elimination of the exudates, the cornea becomes perfectly transparent.

Wible reports the case of eight workmen who were burned by the liberation of concentrated ammonia. The men were working with the upper part of their bodies exposed, and sustained burns of all the exposed tissues including the corneae. In four the burns were slight. Case five suffered a severe chemical burn of the palpebral and bulbar conjunctiva, and other por-

tion of the cornea corresponding to the palpebral fissure. The corneae cleared up completely. Case six proved fatal in a few days. There was a severe burn of both corneae which quickly became steamy, later developed a china whiteness with loss of vision. When the man died on the tenth day, the corneae had not yet begun to slough. In case eight, severe burn of both corneae, there was deep sloughing of the right cornea, three weeks after injury. Fourteen days after injury, there were three small areas of sloughing in the left cornea; healing was very slow.

Pick reports a case in which a midwife instilled into the eyes of a newborn child some drops of a supposed 1% solution of nitrat of silver; the child screamed from intense pain for two hours, when the parents noticed in the place of the eyes, glassy gelatinous formations in the orbits, which were the excessively enlarged, thinned corneae. Both eyes were destroyed. As the same drops had caused intense irritation in two previous cases, the solution was sent to a druggist who stated that it was labelled 10% silver nitrat. Then it was thrown away and no further examination was possible. The question arises whether a 10% solution of nitrat of silver is capable of causing changes like the above. Clinical experience as well as experiments upon animals' eyes are against this supposition. Nitrat of silver is an albumin coagulating poison; it causes extensive desquamation, sloughing, and occasionally cataract formation, but its effect is entirely local; rapid healing with cicatrization succeeds sloughing of the necrosed tissue. As opposed to this action and to that of acids generally, alkaline compounds exercise a malignant effect; it is, in fact, characteristic of these cauterants that, following initial improvement, a deleterious change succeeds pretty rapidly. Pick made experiments on young rabbits with a 10% solution of nitrat of silver, 10% sodium hydrat and carbolic acid. The eyes treated with 10% hydrat and carbolic

acid were lost within a week from phthisis, after perforation of the cornea. The 10% nitrat of silver caused a diffuse opacity of the cornea, but the anterior chamber and deeper parts remained intact. All these experiments, however, failed to cause the striking changes noted above; the latter, indeed, is etiologically an unexplained riddle which extensive experiments alone can solve.

In Stilwill's case the eye had been burned six weeks previously by sulphuric acid; the eyelids escaped. The cornea was opaque, the bulbar conjunctiva red and edematous, and there was symblepharon of the upper lid to the eyeball. There has been no clearing of the cornea, the opacity having steadily increased so as to involve the deeper layers. There is very little vision.

Eilers describes burn of the cornea by nitric acid requiring enucleation on account of permanent irritation from contraction of the conjunctiva; this patient had been dismissed from the hospital twelve days after the injury with but slight opacity of the cornea. Three weeks later, there was present marked thickening of the conjunctiva with proliferation and vascularization of the cornea. Examination of the enucleated eye showed degeneration of endothelium without noteworthy swelling of the parenchyma. The external and central layers appeared softened, traversed by numerous vessels, with cellular infiltration of the epithelium, indicating proliferation of the conjunctiva over the surface of the cornea. The contraction of the conjunctiva brought glandular tissue to the region of the limbus. The interest in this case lies in the fact that changes in the endothelium were apparent as late as fourteen months after the injury; the appearances corresponded to those experimentally produced by Guillery.

Hoppe reports that in a sulphur factory, where sulphuretted hydrogen comes off as a byproduct, employes were at times affected with a peculiar inflammation of the eyes; the latter does not occur at once, as in the case

after exposure to ordinary sulphur vapor, but from two to ten hours after exposure. The symptoms are those of severe irritation resembling the effects of pepper or onion; there was pain, lacrimation, and constantly increasing photophobia, which finally reached its acme in spasmodic closure of the lids; no secretion of mucus from the conjunctiva but abundant secretion from the nose; slight swelling of the lids. In most of the cases quite mild symptoms of intoxication from SH_2 gas preceded the appearance of the irritative symptoms: this leads the reporter to believe that the inflammation was secondary to such intoxication. In 1892 Lehmann, from experiments upon himself and others in atmospheres charged with SH_2 , observed symptoms of ocular irritation which occurred many hours after leaving the apartment. The author also suggests as a possibility that other sulphur combinations may be a cause of the symptoms.

Polack observed burn of the eye from a mixture of acetic acid and chloroform mistakenly furnished by a pharmacist.

Abelsdorf reports the anatomic examination of both eyeballs from a subject who had suffered from intoxication by optochin one and one half years previously, and who showed slight bilateral amblyopia following intoxication. Both globes were removed one-half hour after death; microscopic examination showed morbid foci in the retina and optic nerves; the retinae presented atrophy of the nerve fibers; the ganglion cells showed retraction of the protoplasm and marked sclerosis, extending to disappearance of Nissl's bodies. At the periphery there were vacuoles (senile?) of Bles-tig, atrophic foci of chorioretinitis and secondary proliferation of the retinal pigment epithelium. The principal alteration consisted in extensive proliferation of the adventitia of the arteries and veins, with narrowing of the lumen of the vessels. The vessels appeared to be inserted into the retina, and the internal granular layer to have penetrated into the sensory epithelial

stratum. The granules, external rods and cones were atrophied, the rods more so than the cones, a finding, however, quite frequent in degeneration of that layer. The foci of degeneration of the optic nerves is especially manifest in the places where the central vessels enter the nerve, and partly apparent to the naked eye under the form of depressions; here were noted the same lesions of the adventitia and thickening of the vascular walls with great diminution of the caliber of the vessels. The reporter considers the process as toxic. In Uthoff's case, the vascular changes and the appearances of degeneration were less marked, for the reason that the examination was made shortly after intoxication. All observations hitherto published, including the most recent (Anatomical Institute of Bâle) give in general identical results.

Bachstetz noted a sharply defined band like turbidity and clouding of the epithelium and superficial layers of the cornea in the region of the palpebral fissure from anilin in a cotton dyer.

Boyd observed the effect of water glass (watery solution of silicat of sodium) in the eye. The immediate result was great pain with extensive chemosis. In the course of the next two or three days, there was evidence of tissue destruction as from a chemical burn. On account of the weight and viscosity of the solution, burns by water glass mainly involve the lower part of the eye; the cornea is not usually affected because the irritant does not remain in contact with it for a sufficient length of time; there is little tendency to the formation of symblepharon.

A case with fragments of indelible pencil in the orbit was treated by **Wissmann**. After removing the foreign material, the wound was irrigated with a tannin solution. A chronic inflammation of the orbit persisted for several months. This the author attributed to the caustic action of the dye. Microscopic examination of the tissues showed that a severe progressive necrosis had occurred.

The action of ammonium chlorid on the eyes of rabbits has been studied by **Siegrist**, to determine the value of washing out the eye after such an injury, and how long a time may elapse before it ceases to be of service. He obtained a very strong ammonia reaction from the aqueous humor removed within ten minutes of instillation of the drug. Even at the end of two minutes, there was a distinct ammonia reaction from the aqueous but not from the vitreous. On the other hand, a reaction could still be obtained five hours after cauterization. Apparently washing out of the conjunctival sac is of no use; even after five seconds it is too late to be effective. On the other hand, tapping of the anterior chamber 2 minutes after instilling the drug caused the cornea to clear in five days, while the fellow eye subjected to the same injury, but not tapped, showed a small ulcer with hypopyon and diffused clouding.

INJURY FROM GOLF BALL.—**Halliday** reports an injury to the eye while sawing thru a golfball the day before; there was great swelling of the eyelids and chemosis of the conjunctiva, with photophobia and a serous discharge. The cornea, clear at first, became somewhat steamy a fortnight later. The swelling of the conjunctiva slowly subsided, leaving red, brown and green patches of mottling; in about five weeks the eye was settling down to normal.

INJURY FROM STING OF A WASP.—

A boy, aged 8, was stung in the left eye by a wasp. At the examination two weeks later, **Koyanagi** found diffuse opacity of the cornea, with a dense disc a little below the center, pupil very much enlarged, without reaction, hypopyon, ciliary injection. After three weeks the lens showed opaque spots and the tension was very much increased. Anterior sclerotomy, and after a week trephining according to **Elliot**, followed in two months by linear extraction of the cataract.

Koyanagi studied the effects of stings of wasps and honey bees on rabbits, and reports in detail six ex-

periments which showed severe damage to the sphincter muscle of the iris with subsequent mydriasis, undoubtedly due to the action of the poison; abnormal proliferation of the endothelium of Descement's membrane, especially in the sinus of the anterior chamber; depigmentation of the iris from degeneration of the chromatophores; progressive cataract. The glaucoma in his patient was most probably produced by the closure of the sinus of the anterior chamber by the abnormal proliferation of the endothelium, and perhaps also by the mydriasis. The cataract caused by direct action of the poison does not remain stationary, because the poison injected into the cornea, on account of its easy solubility in the tissue juices, may act continuously, by diffusion, upon the lens.

INJURY FROM BITE OR SCRATCH OF RAT.—**Weidler** observed in an infant, besides bites of the skin, an abrasion about 2 by 4 mm. long on the inner portion of the cornea, from the bite of a rat or scratch of its foot. The corneal epithelium and perhaps Bowman's membrane were stripped down, and lay in a curled up mass at the lower part of the abraded area; there was a slight pallor of the denuded tissue and the edges of the ulcer, with some injection of the bulbar conjunctiva, photophobia and lachrimation. Perfect recovery ensued leaving the cornea entirely clear.

ABRASIONS:—Injuries to the cornea from blades of wheat or sugar cane is the subject of a paper by **Santos Fernandez**, comparing his experience in Europe with that in Havana. The special danger is in the liability to the access of infecting organisms, which are particularly liable to produce disastrous results in tropical climates.

CONTUSIONS:—**Burnham** writes upon blows over the ciliary region. In his first case, a bird shot was so deeply imbedded in the sclera, as to show the dark colored ciliary processes at the bottom of the deep depression left by the shot after removal. Twelve hours subsequently the patient was in a semi-conscious condition, wandering of

mind, decided photophobia. Ophthalmoscopic examination next day showed clear media and no signs of injury in the interior of the eye. Vision normal. In two months the eyes could be freely used.

In a second case the eye received a severe blow. Examination next day showed swelling and discoloration of the lids; vision normal, media clear. One spot of the ciliary region was continuously painful and extremely tender upon the slightest pressure. The man was in a thoroly dazed condition. The shock to the nervous system was so great (the blow had been received in attempt at robbery), that the patient was kept in bed for three weeks. The spot remained painful and the eyes could not be used for months. This case, having a medicolegal aspect, another oculist was called in, who decided, finding that the eye was quiet, media clear, vision normal, absolutely no sign of injury within or without the eyeball, that the patient could resume his full duties; with which opinion the reporter does not agree. He refers to two other similar cases in which the symptoms and appearances were exactly the same; in these also several months elapsed before even ordinary use of the eyes could be borne. Here lies the medicolegal point: that the opinion of an oculist consulted for such injuries, at the end of some time, is of little or no value, if the decision be based solely upon the condition observed at the time of the examination, without full knowledge of the history and peculiarities attendant upon these cases.

In **Gomez Pereyra's** case, total subluxation of the eyeball was caused by a blow. Reduction was effected by canthotomy and very cautious and continued massage of the eye over the skin of the lid. **Lapersonne, Ler-moyez** and **Sieur** write of iridodialysis from ocular contusions.

Schurmann precedes the description of a case of **Vossius' annular opacity** of the lens, by a brief reference to previous publications upon the same subject. The phenomenon is described by

almost all observers in well nigh the same terms. The nature and origin of the phenomenon and the views expressed are only suppositions.

Hesse was the first to examine his case with the corneal microscope; he found that the opacity consisted entirely of a deposit upon the anterior surface of the lens; this led him to the belief that it consisted of blood. **Vogt's** (*Clinical and Experimental Researches upon the Origin of Vossius' Annular Opacity*. Z. f. A. 1918, Vol. 40), view is that the opacity consists of pigment from the pigment layer of iris. All previous examinations contribute nothing to the question, as they were all made with inadequate means. Microscopic perimentation of an enucleated eye, experimentation, or at least additional exact observations, can solve the problem with certainty. **Schurmann's** case was very carefully observed with the corneal microscope and **Gullstrand's** slit lamp. The case occurred in a lad who was seen three hours after a severe injury of the eye; the anterior chamber and vitreous contained blood so that the eye could not be illuminated. The following morning a delicate annular opacity was discovered upon the anterior surface of the lens by direct illumination, whereas not a trace of it was visible with lateral illumination. The next day the following details could be distinctly observed with the binocular microscope and **Gullstrand's** slit lamp; the nicely rounded and pretty evenly wide annular opacity about corresponded to the normal condition of the pupil. The center of the same remained clear for a month, when a grayish white star like opacity became visible beneath the capsule of the lens. (Fig. 1) A number of coarse brownish red bits of pigment (much coarser than the ordinary remains of a pupillary membrane) were seen in the pupillary region upon the anterior surface of the lens; these permitted certain determination of the positions of the annular opacity with reference to the lens shagreen as follows: bits of pigment, annular opacity and gray opacity were observed at certain points plainly

lying in two superimposed planes; the first two (bits of pigment and annular opacity) upon the clearly visible shagreen of the lens, the gray opacity, on the other hand, beneath it. It seemed as if the shagreen had simply changed its color in the region of the Vossius ring. The delicate marking of the shagreen was clearly recognizable as lying in one and the same plane; where the annular opacity lay, the absolutely unchanged surface of the lens looked like bronze, giving the impression that the shagreen was covered with exceedingly fine dust; individual particles could hardly be distinguished. The bits of pigment above mentioned appeared coarser and were of an entirely different dull color. The gray opacity, situated directly beneath the shagreen did not appear until the fourth day following the injury; it was entirely invisible at first (like a cataractous cerulea) in transmitted light, but well seen upon lateral illumination with the Hartnack loupe; it changed its form and density almost daily. All these opacities disappeared in the course of two months, with the exception of two or three of the pigment particles. The pupil remained permanently somewhat larger than that of the other eye; the sphincter of the iris was intact; vision full.

This case, like those of Vogt, decidedly confirms the view of Hesse that Vossius' ring is due solely to a deposit upon the capsule, and not to injury of the capsule epithelium or lens substance itself. The gray opacity mentioned, which did not develop until three days after that of the ring, lay, on the other hand, clearly beneath the shagreen; this injury of the lens substance itself which, however, was not followed by the slightest change of surface, had, in all probability, nothing to do with the annular opacity. The gray opacity might as well have occurred alone. (Wagenmann refers to opacities of the lens following contusion of the eyeball, and Löwenstein after lightning stroke.) Its remains still persist while the annular opacity has entirely disappeared. There can thus

be no doubt that Vossius' ring is a pure deposit; observations alone without pathologicoanatomic examination are unable to determine absolutely the nature of such deposit. The question of the mode of occurrence of the opacity is not yet clear; temporary rise of tension is the primary condition. According to Vogt, in addition to such increase, the exit of albuminous fluid with the pigment is necessary to render possible the deposit upon the capsule of the lens; both of these conditions are probably always present in contusion but the opacity is rare; there are probably other unknown factors required to cause it.

Fellows reports tear of the retina in a young man hit by a base ball, causing blindness in the left eye.

Vergne observed the same day two cases of complete luxation of the globe forward, in one of which the surgeon in charge proposed immediate enucleation. In both cases the luxation had been caused by a considerable hematoma of the orbit from the passage of a splinter of shell into the depths of the orbit; radiography failed to show any foreign body. The eyeball was lying in front of the lids; the latter formed a tight band behind the globe; there was considerable chemosis of the bulbar conjunctiva, the lids were edematous; no movement whatever of the globe was possible. The following procedure for restoration was employed: the margin of the upper lid was grasped by forceps near the junction of the middle with the outer third and everted as much as possible in order to present the tarsal conjunctiva; a needle armed with a silk suture was made to traverse the entire lid about 1/2 cm. from its free border. A second needle, threaded with the other extremity of the suture, was passed in like manner from within outward thru the lower lid. A second suture was similarly passed at the junction of the middle thirds with the inner thirds of the palpebral margin. Traction was made by means of the threads so as to draw the lids over the surface of the globe, which then slid of itself into

the cavity of the orbit; where this maneuver is insufficient, the index finger placed upon the anesthetized cornea suffices to replace the eyeball. To retain the globe after such reposition, the sutures which have served for the reduction are tied over a thick pledget of gauze placed upon the palpebral aperture; the sutures **not** being in contact with the cornea, **there** is no risk of traumatism to that membrane. If, however, any fear of such a possibility should arise, one of the sutures may be removed and the condition of the eye examined. **Lister** writes on the pathologic aspects of certain concussion changes in the eye.

In **Radcliffe's** case, double cataract followed a blow with whip lash, a keratome was entered at the limbus, the capsule opened with the point of the knife, and the cortex milked over the blade of the instrument, the knife being carefully withdrawn to prevent prolapse of iris.

Bettremieux and **de Gandt** report the case of a man who received a violent blow on the left eye. The upper lid was cut and the fundus could not be seen on account of a profuse hemorrhage, but the eyeball seemed to be intact; the patient suffered much pain; as the hemorrhages were partly absorbed, new ones appeared. Vision—faint perception of light. Six weeks later, eye half full of blood, vitreous cloudy. A simple sclerectomy was done, followed by relief from pain and gradual resorption of blood. The authors believe that a nonperforating sclerectomy facilitates the return of blood from the eye.

Goldsmith reports the case of a man aged 50, who had received, 14 days previously, a blow on the head with a large coal shovel. There was a large coloboma of the iris in the left eye, upwards and outwards; the lens was dislocated subconjunctivally, and lay at about a right angle to the base of the coloboma, to the nasal side. Vision was improved to 6/60 with a + 10 lens. The right eye, which had received a "cowardly blow" some twenty years ago, was reduced to perception of light and

he had a large upward coloboma of the iris. With a + 10 D. vision was increased to 6/60. The double misfortune was due perhaps to some inherent tendency to dislocation.

Dubois referred to case of detachment of the retina occurring some time after a fall on the head, referred to by **Rochat** at a former meeting, where in the discussion many did not agree with **Rochat** that indirect traumatism could produce detachment. **Dubois** has observed a case in which detachment was found directly following a fall on the back of the head, in a boy of 17, while playing football. A few hours later he noticed the upper part of his vision seemed covered with a curtain. When seen by **Dubois** 5 days later, vision was 2/60, fingers and detachment of the lower part of the retina, but no rupture.

Terrien has observed several cases of spontaneous rupture of the globe. In one there was manifest ulceration; in the others the ulceration was imperceptible, being perhaps so minute with neuroparalysis where a large corneal tear began. The cornea was transparent above and below. These eyeballs may be retained, abscising the prolapsed iris and retina and preserving, with or without prothesis, a fairly good looking eyeball. According to **de Wecker's** law, eyes affected with absolute glaucoma are in no danger of sympathetic ophthalmia. As regards the mechanism of such rupture, undoubtedly the decompression of a hypertonic eye, sclerosed in all its parts, may suffice, but as in spontaneous or postoperative expulsive hemorrhages, immediate or retarded, there is at times also a process of formidable hemorrhagic congestion, which facilitates fissure and finally evagination of the membranes—the maximum of hemorrhagic glaucoma. The process is similar in etiology, tissues involved, and crisis, to that of certain vast cerebral and meningeal hemorrhages. **Israel** also reports a case of traumatic rupture of the globe, and **Bergemann** on rupture of the cornea and expulsion of the lens with preservation of vision.

Reis observes that when, following severe injury to the head (contusion) a central scotoma of both eyes appears, causal connection between the trauma and defect of the field of vision should not be assumed, but strong reasons compel to regard such binocular central scotoma as the sole symptom of a retrobulbar neuritis and partial optic atrophy; but the case is different in monolateral central scotoma. Such cases are of quite secondary importance, altho caused by the trauma, but subordinate to local and general symptoms.

The question of traumatic detachment of the retina is discussed by **Brückner**, especially with reference to its medicolegal importance. The subject is discussed from its theoretic aspects with some references to the literature.

In an editorial, **Stedman** concludes that none of the existing theories regarding the manner in which ocular contusions are produced apply to every case, because the conditions under which the contusions occur are so variable.

RUPTURE OF COATS.—**Blue** observed rupture of the choroid and retina in an eye struck by a nail. There was great pain and immediate dimness of vision which continued for some time; the latter improved to 20/70 in the course of a few months. There was a linear corneal scar to the temporal side, and a vertical linear tear in the fundus thru the choroid and retina at the outer side of the macula.

Bollack found upon ophthalmoscopic examination of an eye which had suffered a contusion, below and somewhat external to the macula, a grayish spot due to edema of the retina. Upon absorption of the edema, a small hemorrhagic surface appeared slightly larger than the papilla and of a carmine red color; the hemorrhage became pale and gave place to a very slightly unpigmented zone, perhaps slightly depressed, traversed obliquely from above downwards and from without inwards by a curvilinear line of pale orange tint. The spot has undergone a

final modification, having become white and bounded by a grayish pigmented border. Inasmuch as this traumatic lesion occurred at the most distant portion of the fundus, far in rear of the retinal vessels, the author ascribes it to a sclero-choroidal lesion with rupture or tear of the sclera.

Alexander showed a girl who had bilateral traumatic ruptures of the sclera.

In **Dobson's** case the injury was caused by concussion of air from an explosion of a bomb 1/4 mile away. This led to retinal and vitreous hemorrhages, and the eye became blind.

DISLOCATION OF LENS.—**Frenkel** describes the symptoms following trauma of the anterior segment, and urges that practitioners should be able to recognize contusion not accompanied by perforation. The main results of contusion are subluxation of the lens, partial traumatic cataract, usually stationary, and laceration of the iris. The anterior chamber is generally of uneven depth, mydriasis is likely to be present with sluggish reflexes. The visual acuity may be materially reduced. Progressive cataract or glaucoma is extremely rare, tho a mydriatic should be avoided from danger of raising tension. **Mittelbiberach** makes the subject of thesis, contusion of the eye with dislocation. In **Krauss's** case of traumatism of the eye and surroundings, the cornea presents peculiar gray white, punctate opacities; the pupil is widely dilated, showing a very narrow rim of iris; anterior chamber very deep with a black pupil. The lens could be seen swinging toward the center of the vitreous, as tho attached to a hinge. A few fine opacities in the vitreous; fundus well seen; nerve gray white; arteries extremely contracted, veins comparatively full; choroidal pigment heaped irregularly thruout the fundus, especially in the macular region, but no evidence of rupture. Fingers at 1 foot, and apparently good light field. The above conditions suggested rupture of the ciliary body, complete dislocation of the apparently clear lens, with partial optic atrophy and choroidal changes. X-ray showed

no fracture of the orbit or surrounding bones. **Masuda** reports the histologic findings in secondary glaucoma following traumatic luxation of the lens into the vitreous. The enucleated eye showed degeneration in the region of the macula. The visual cells and the retinal tissue had disappeared to a great extent, and were replaced by glial tissue; infiltration of pigment into the tissue was also present. In the pigmented epithelial layer, the cells were partly absent, but in other places grew luxuriantly to such an extent that the pigment cells were forced thru into the degenerated retinal tissue. The subretinal connective tissue presented an exuberance of glial tissue; the capillary layer and the vitreous membrane were partly absent, and incomplete vessels of the choroid could be traced into the retina.

The author claims that this atrophic condition was the result of a contusion, as he had seldom seen anything similar upon experiments upon animals; the latter are fully described in the *Festschrift* to Prof. Komoto.

In **Patterson's** case, following contusion, the eye gave no indications of external injury at the time, but the eye-ground was seen thru a haze, which seemed to be more marked on the temporal side. A week later, the outer half of the pupil failed to dilate under atropin, the temporal half of the iris seemed tremulous, and the media continued hazy. There were flashes of severe pain for periods of one half hour at a time; tension 59 mm. which sank to 32 under pilocarpin and eserin. Operation was refused. Three and one half years later, vision had fallen to faint light perception with uncertain projection. With the ophthalmoscope, only a red reflex could be discerned, while by oblique illumination the iris was very tremulous, and the lens capsule could be seen floating in the vitreous.

PENETRATING WOUNDS.—In **Bane's** case, the eye was penetrated by a fragment of a nail about 25 cm. long and 4 mm. in diameter; it entered thru the lower nasal quadrant of the cornea,

stuck in the eye and was pulled out by a layman. The depth to which the nail had entered the eyeball was uncertain. The cut in the cornea was angular and 6 mm. long; iris incarcerated in the wound; blood occupied the lower two-thirds of the anterior chamber for two days after the accident. Vision, light perception, eye painful, tension about normal.

In **Gifford's** case, the eye was injured by the patient's own finger, resulting in a one inch long clean cut of the cornea with a prolapse of iris in the resulting cicatrix and beginning traumatic cataract.

Pyle observed a penetrating wound of the cornea by a piece of glass, removal of which was followed by complete collapse of the anterior chamber. Recovery of vision was perfect, and within a few months all evidence of the corneal wound had disappeared.

Shields reports a perforating wound which extended from the lower central part of the cornea well into the sclera, and the iris presented in the wound; a good deal of vitreous was lost during the removal of the protruding iris, so that no further interference was attempted. X-rays showed no intraocular metallic foreign body. Five weeks later the eye was quiet, vision 20/200 and it was proposed to attempt to save the eye.

In **Meller's** case two months after a perforation of the eye by a splinter of wood, there was intense inflammation about the wound, while the iris and posterior portion of the choroid were but little affected. Granulation tissue was seen to line the scleral wound, extend into the eye, cover the surface of the eyeball as far as the limbus and invade the neighboring orbital tissues; the granulations were typical tubercles of epithelioid cells; there was no caseation nor were any bacilli found. The other eye was intact. The question arose whether this was a case of sympathetic ophthalmia without lesion of the other eye, an instance of which had been described by Meller himself. The reporter does not think so. In this connection, he combats the identity of sympathetic ophthalmia and tuberculosis. This is the first re-

corded case of primary tuberculosis of the eye following a penetrating wound; the absence of bacilli is no argument against the diagnosis: it is well known how rarely bacilli are found in intraocular tuberculosis; neither can the infection be of endogenous origin, for the tubercles are sharply localized about the wound, and the uvea, so prone to this infection, is but little involved. Commenting upon this case, Morax observes that sporotrichosis is known to form granulation tissue with giant cells identical with the tuberculous process. The anatomicopathologic diagnosis in this case without bacteriologic confirmation must be considered extremely doubtful.

Wood observed three cases of total removal of iris. In the first case, with the history of the eye having been struck by a piece of iron, there was a fine cut, not more than $1/8$ inch long, just outside the cornea; anterior chamber full of blood; the presumption was that the piece of iron was in the eye, altho a skiagram was negative. Three attempts at extraction with a small magnet with a fine terminal introduced thru the wound failed. The eye remained quiet; a week later the blood had more than half gone, but no iris was visible, having been entirely removed thru the tiny wound, with no foreign body in the eye. Some months later the lens was found to be clear and the vitreous almost clear. Vision equalled $6/9$; there was no trace of iris, and the whole lens and the tips of the ciliary processes were visible all around.

In the second case, following injury by wire netting, the anterior chamber was full of blood with a scar above, with iris pigment in it. Two weeks later the iris was found to be absent, and a laceration of the lens capsule was discovered. Subsequent removal of the lens gave $6/9$ vision with correction. The eye had evidently been pierced by an end of wire and the iris hooked out, as in the first case, thru a tiny opening.

In the third case of chronic iritis, punctate keratitis and iris bombé with no causal history except bad oral sepsis, iridectomy was attempted. The patient gave a sudden cough and the forceps

brought out the entire iris, without an apparent tear in it; the lens was seen to be opaque. The eye quieted down quickly and there was no more inflammation. It would appear that in some cases of chronic obstinate iritis, total removal of a thickened iris is not merely easy, but very effective as a cure.

Ascher observed, following perforation of the sclera, 3 mm. from the limbus, a circular dark line at the periphery of the lens; media otherwise clear with the exception of some delicate and deep folds in the lower portion of the cornea. Parallax movement showed that the dark line must be situated either in the most posterior layers of the lens or in the most anterior portion of the vitreous; it was concluded that the opacity was due to a slight hemorrhage into the posterior chamber, between the posterior capsule of the lens and the anterior limiting membrane of the vitreous. This supposition is strengthened by the fact that the ring disappeared entirely, the blood having been evidently absorbed. The immobility of the ring upon movements of the eyeball argued against vitreous hemorrhage; while the absence of any indication of progressive increase, as well as the form of the opacity, negated opacity of the lens. Ordinarily in perforating wounds of the sclera, the hemorrhage would be expected in the vitreous near the seat of perforation; in this case it may be assumed that a slight hemorrhage from the inner wall of the ciliary body reached the posterior chamber, and was thence forced into the capillary space between the lens and vitreous body. The *modus operandi* may be imitated by placing a watch crystal upon a glass plate and dropping a few drops of colored water into the angle between the crystal and the plate; the fluid immediately surrounds the point of union between the crystal and the plate in the form of a ring, which seen from above, is quite like the ring form opacity observed in this case.

In Pockley's case a piece of wire caused a perforating wound in the cornea and iris with traumatic cataract; the latter was needled. Two and one half years later, a small elevated patch of brown

pigment, which appeared to be in the structure of the iris, was present upon the margin of the laceration of the iris; the patch had apparently split the iris into two layers about 2 mm. in diameter; it had new vessels running into it, and there was a slight blotch on the temporal side of the cornea, indicating an inflammatory condition. The reporter considered it highly probable that the formation in question was a small implantation cyst of the iris. He proposed to keep the patient under observation, and if the mass increased in size, he would perform a small iridectomy and remove it.

In **Strader's** case there was a corneal wound about 12 mm. long, from the middle of the lower outer quadrant to the upper limbus; large iris prolapse, lens cataractous. A very large conjunctival flap was dissected loose from the upper half of the eyeball, and stitches were placed at either end of the flap. The lens was then expressed, and the sliding conjunctival flap pulled down by the two sutures until it covered nearly the entire cornea. The advantage of the sliding flap consisted in the fact that as the anterior chamber refilled the prolapsed iris was pulled out of the wound.

In **Key's** case a sharp piece of metal penetrated the cornea, iris and lower margin of the lens; X-ray negative. In 48 hours infection was evident, lids swollen, violent conjunctival and iritis reaction, purulent exudate in the anterior chamber and apparently also in the vitreous; intense pain. Treatment was limited to hot bathing and 2000 units of antidiphtheritic serum every 3 or 4 days for about two months. Relief of pain in 48 hours; the eye gradually quieted; three months later it presents a painless, mildly inflamed globe, slightly subnormal tension, cataractous lens, clear and transparent anterior chamber and pupillary space. **Hedges** takes up perforating wounds of the eye and cites three cases showing that prognosis should be guarded in the case of any perforating wound, even if made by an apparently clean instrument.

Lacoste observes that it is no longer a question whether every penetrating wound of the eye should be surgically

closed at once or not; it is only a question of method. For many surgeons, a conjunctival covering is the treatment of choice. The writer shows that the conjunctival covering and the corneal or scleral suture have their precise indications: when the wound is small and the lips in satisfactory coaptation, conjunctival covering should be done; where, on the contrary, there is an extensive wound, gaping widely, recourse should be had to the suture plus conjunctival covering, if required. Certain precautions, however, are necessary with the suture; there should be rigorous asepsis and the suture should be applied during the first 24 hours following the injury. Under these conditions the results are sometimes unlooked for, both as to conservation of the eyeball and more or less complete restitution of the sight.

Griscom's case illustrates conservative treatment of a severely injured eye. When seen a few hours after being struck by a flying piece of wood, there was a gaping wound at the limbus with prolapse of iris and vitreous. In two weeks the wound had healed with an anterior synechia, and a cyst had developed in the sclera at the site of the injury; the cyst grew rapidly in size to 3 by 4 mm. A compress bandage was applied and a solution of alum, eserine and adrenalin instilled twice daily; in 5 weeks the cyst had entirely disappeared, the eye was quiet and the tension normal.

Federmann published statistics of 164 cases of perforating wounds of the eye, which he has seen in children under 14 years of age. In 59 of the cases enucleation was necessary because of sympathetic ophthalmia, infection or panophthalmitis. The author appended tables of the cases observed, indicating the age of the patient, the origin of the wound, the instrument which produced the injury, the nature of the injury and the final result.

FOREIGN BODIES IN CONJUNCTIVA AND CORNEA.—**Santos Fernandez** calls attention to the liability of foreign bodies to remain in the conjunctiva without being felt, and the uncertainty of the history obtained regarding them. Only

minute examination can establish a correct diagnosis.

Vergne observes that the difficulty of extraction of a metallic foreign body situated in the cornea increases with the depth to which the foreign body has penetrated. The difficulty becomes considerable when the foreign body, having traversed almost the entire structure of the cornea, remains in that membrane while its free end projects into the anterior chamber. The methods of extraction are numerous; the writer wishes to call attention to the one which succeeded in four cases, in which other methods had failed. In three of the cases, the small metallic bodies were scales; violently projected, they had entered deeply between the layers of the cornea. The problem consisted in reaching the foreign body thru as small a wound as possible—a procedure which should not be obscured by scraping of the tissues, which have to be constantly removed. The galvanocautery seems suitable for this purpose, having a very sharp point, and when brought to dull red, giving out but little radiant heat and causing no injury to the surrounding tissues. Proceeding delicately and carefully, the tissue concealing the foreign body is destroyed; the latter is concealed at first under the opacity caused by the cauterization, but is soon rediscovered and the operation continued. When the foreign body is reached, it is easily removed by fine tooth forceps. After such deep cauterization, fine carbonaceous debris always remains in the wound; this must be removed like any other foreign body. The cicatrix resulting from this operation is small, at least no larger than the result of any other form of intervention. In a fourth case, where the foreign body had entirely traversed the cornea and one extremity had passed into the anterior chamber, the same procedure was followed with a satisfactory result.

Rutten extracted a sliver of iron which had been embedded three months in the cornea without impairment of the visual acuity.

In **McIlroy's** case of a soldier, fol-

lowing injury of the eye by the explosion of a shell, the eye remained uncomfortable, ultimately requiring admission to hospital; the vision was then found to be 6/12. On careful examination with the corneal loupe, a small whitish object was seen at the outer part of the limbus; there was a slight degree of local inflammation involving the cornea for a short distance; a small round area of grayish color lay about 3 mm. to the outer side of the object. The foreign body was dislodged by a spud, drawing after it a small hair which had been imbedded in the subconjunctival tissue. The object first observed was the root, which had become slightly bulbous and opaque; the buried end of the hair was white and soft. The eyeball had evidently been forcibly struck by a piece of grit which pierced the conjunctiva at the sclero-corneal margin and, passing in an outward direction, carried with it an eyelash, the root of which remained above the surface at the limbus, setting up a slight local irritation.

FOREIGN BODIES IN ANTERIOR CHAMBER.—**Meyling** reports a wound of the eye by a steel writing pen; immediate extraction of the points of the pen brought with it an eyelash clasped by the points. Months later, when the blood from the anterior chamber had been resorbed, two lashes were seen upon the anterior capsule of the lens, imbedded in fibrin. The lashes are still visible and show loss of their pigment and fibrillary decomposition; there was not the slightest irritation.

Stargardt reports the case of a girl of 7 whose eye had shown repeated periods of irritation for a year and a half. Examination with the corneal microscope (15 diameters enlargement) revealed two very fine plant hairs lying on the anterior surface of the iris, the ends being included in gray nodules of exudate. Two gray scars penetrating the whole thickness of the cornea were also shown. Under complete general anesthesia a corneal incision was made as for iridectomy and after repeated attempts, each hair was extracted with smooth iridectomy forceps.

Demaria saw a girl of 16, who in play had been struck by the corner of a card which penetrated the cornea and iris. She presented severe panophthalmitis. A foreign body was extracted with iridectomy, followed by subconjunctival injection of mercury cyanid, the eye healing with traumatic cataract. The foreign body, a fragment from the head of a match, gave cultures of the *bacillus subtilis*, only.

Eigler reports a case in which an eye had been injured 25 years previously by a piece of steel. The eye has lately been badly inflamed for three or four weeks. The piece is plainly visible, being held firmly between the cornea and lens at the upper part of the pupil. The eye is not irritable now; vision light perception. The question is, should anything be done now? In the discussion, Walker and Jackson were of the opinion that the eye should be watched and the man warned to seek advice if trouble should return.

FOREIGN BODIES IN THE LENS.—**Garcia Mansilla** observed, following accident, with no external evidence of wound or abrasion of the cornea or sclera, a cataract of dark color which after sometime was operated upon by the reporter. A metallic fragment was found in the lens; it seemed that the foreign body had passed thru the cornea and then into the lens without leaving any scar.

In **Perlmann's** case, a man, aged 47, had both eyes injured by an explosion, causing traumatic cataracts, which were extracted after a week, with vision in the right eye of 6/6, left eye 6/5, with correction. It was proposed to give him 30% compensation indemnity. A piece of brass remained upon the secondary cataract of the left eye. Both eyes were without irritation for nine months. This was not sufficient to consider the present condition as permanent, as late sequelae may recur after many years. It seems that brass is better tolerated by the eye than copper, and the more so the less copper the brass contains.

Van Duyse and Danis report wound of the eye by a splinter of cast iron;

under the anterior capsule of the crystalline lens was a circlet of nine ochre colored foci with diffuse outline, composed of a collection of brown dust or granules more or less concentrated. Between these foci were fine russet spots occupying the pupillary area (siderosis speck); a few pigment spots were situated upon the anterior surface of the lens, which latter is now becoming cataractous. The pigment spots upon the capsule might be congenital remains, or pigment of uveal or iritic origin, or blood debris. The subcapsular yellow spots are those of siderosis; their star like form is not clearly explained. X-rays, giant magnet and magnetomer of Gallemaerts were negative; it is probable that the very small splinter of iron had become completely transformed into an iron salt, which has no influence upon the three methods of examination employed for the detection of intraocular magnetic foreign bodies.

Mansilla reports on foreign bodies in the inner canthus and in the lens.

Roll observed an eye in which a fragment of steel had been imbedded for 18 years. Soon after the particle entered the eye, a skiagram located it. The eye was blinded for a week immediately afterwards, but the trouble then passed off. A few weeks after the accident, the vision was 6/6 and the media clear. A tiny nebula is now visible near the limbus. Vision has declined to 6/18. The only change in the ophthalmoscopic appearances after all these years was the development of an area of atrophy below the foreign body, with a slight deposition of pigment at the same site; there were also a few vessels which were either remnants of the choroidal vessels or were collaterals.

GLASS IN THE EYE.—In **Bane's** case an eye had received perforating injuries thru the cornea and sclera from the explosion of a 22 caliber rifle; vision, light perception. Displacement of the iris inward gave the appearance of an iridectomy; the lens was cloudy. One fragment of glass had been removed

from the cornea, and another piece had come out spontaneously.

Werner reports the case of a boy aged 13, who was preparing oxygen by heating chlorat of potassium and manganese dioxid, when the flask exploded and injured his eyes. The day after the accident revealed both corneas wounded, the right slightly with no prolapse of iris, the left severely with marked iris prolapse, which was excised. In both eyes traumatic cataract formed. Inflammatory signs in the right eye suggested the possibility of a foreign body, but none could be located with the X-ray, and as the eye was not improving it was enucleated. On examination of the eye, a piece of glass 6 mm. long by 2.5 mm. wide and 1.5 mm. thick was found embedded in gelatinous inflammatory products including the ciliary body, lens and iris. The left had quieted down since enucleation of the right, and with extraction of the traumatic cataract, vision could probably be improved.

Procksch saw a patient who had been injured by a piece of glass which penetrated the sclera and lodged in the globe. After the blood had absorbed, a horizontal rupture was seen in the choroid below the macular region, the retina was detached above, and a splinter of glass was clearly visible in the vitreous. The foreign body could be seen best with the ophthalmoscope when the eye was transilluminated. The glass caused no irritation and the eye remained free from inflammation.

Muncy writes on removal of non-magnetic substances from the vitreous chamber.

STEEL IN THE EYE.—**Vogt** reports that the right cornea of a man, aged 19, had been 15 months previously penetrated by a piece of steel. The foreign body could not be seen ophthalmoscopically, but by a special method of Vogt with Roentgen rays, it was found in the lower temporal region of the ora serrata at the densest opacity of the vitreous. The pupil, completely immovable to light, gave a yellowish reflex, especially distinct in daylight. Vision 1/4. The cornea, which ap-

peared under the usual methods of examination, colorless, showed in nitra—and Microarc-lamp pencil, microscopically and macroscopically, marked yellow coloration from yellowish and brownish dots in the stroma; (2) a line of epithelial pigment; (3) dots in the aqueous, apparently cellular; (4) pigment containing elements, which became numerous after application of the inner pole magnet, perhaps from mobilization of the chip, but could not be extracted by the magnet; (5) sub-capsular dotting of the whole anterior surface of the lens, considered as expression of deposit of iron in the capsular epithelium; (6) marked yellow color of the anterior capsule, due to the former; (7) destruction of the vitreous, with unusually large red pigment lumps and white intermixtures, especially near the foreign body; (8) together with Haab's toxic degeneration of the macula, a superficial retinal focus, (formation of connective tissue?) and in red free light, numerous preretinal reflex lines, partly vertical, partly radial to the macula, which may be the expression of superficial folds of the retina.

In **Strickler's** case, a small particle of iron, imbedded in the iris, had been extracted with a hand magnet. The patient was subsequently struck in this eye resulting in immediate blindness. The lens was cataractous, and lens substance escaped thru an opening in the cornea. The eye finally became blind and painful. A small foreign body appeared to be projecting from the iris, and this was confirmed by the X-rays. A piece of steel was easily extracted thru an incision at the corneal limbus; the remaining lens substance was washed out, and an iridectomy performed. There remained a firm mass of exudate between the iris and the original corneal wound. The eye finally became comfortable, with slight improvement in vision.

In **Fagin's** case a boy was struck in the eye by part of the head of a nail three years previously. The foreign body, which penetrated the cornea just above the pupil, was not found or

removed. Vision was soon lost. The iris has become discolored and atrophic, the vitreous filled with opacities; the eye has lately become red and painful. The boy has been in the State School for the Blind, altho the vision of the other eye is 20/20. Removal of the blind eye was advised but refused.

In **Ollendorf's** case an iron splinter was tolerated without reaction more than thirty years within the eyeball; symptoms of irritation arising, the splinter was removed with a satisfactory result.

Schwenk observed a comparatively quiet eye with full visual acuity in which the X-rays showed a foreign body. The magnet had been twice used unsuccessfully.

Goldberg observed exudate of choroiditis resembling an intraocular foreign body. The eye had been struck by a fragment of steel, which had been removed, leaving after it a small wound, which suggested the possibility of another foreign body. The choroiditis above mentioned presented the appearance, with its pigmented area, of a foreign substance. Operation unsuccessful, of course, led to the correct diagnosis. Normal vision, however, followed the operation.

Asmus reviewed the literature from 1914 to 1918 on the diagnosis and extraction of foreign bodies from the eye.

SIDEROSIS.—**Coppez** proposes a new method of diagnosis of ocular siderosis. Small metallic foreign bodies may become fixed in the retina, as is well known, and cause only moderate disturbances, and in some cases migration of the pigment takes place which gives to the lesion the deceptive aspect of a long standing focus of chorio-retinitis; a floating opacity of the vitreous immediately antecedent to this focus shows, however, that the lesion is a recent one; these opacities lying in close proximity to the deep membranes are generally absorbed in a very short time. The usual methods of diagnosis (giant magnet, magnetometer, radiography) may be negative, for the reason that the body has become

rusted and lost its magnetic properties, or is very small, or has been entirely dissolved in the fluids of the eye. Mydriasis is frequent in siderosis from impregnation of the muscles of the iris by the iron in solution, with consecutive atrophy of the muscles. It is, however, important in cases of this nature to establish a positive diagnosis of ocular siderosis, especially from the point of view of legal responsibility in compensation. The same writer refers to an interesting case in which siderosis was not recognized; nontraumatic choroiditis with consecutive propagation to the iris was mistakenly diagnosed; all the usual signs of siderosis were absent. **Coppez** tapped the anterior chamber and examined the contents for iron in the following way: the aqueous humor, collected upon a watch chystal, was evaporated upon a water bath in the presence of nitric acid in order to transform the ferrous into ferric salts; the nitric acid was then replaced by sulphuric; finally the ferric sulphat thus formed was dissolved in distilled water and subjected to the action of a weak solution of sulphocyanid of ammonium: the fluid assumed the characteristic blood red color, thus demonstrating the undoubted presence of iron in the aqueous humor. In the discussion, **Leplat** expressed the opinion, contrary to that of **Coppez**, that the foreign body had not been absorbed. In support of which, he referred to a case of his own; at a second examination (mydriasis and rusty discoloration of the iris) there could be no doubt that the eye harbored a bit of iron and, consequently, notwithstanding a third negative examination with the sideroscope, operation was performed and a very small bit of iron was extracted, of course thru a scleral incision, by the electromagnet. It was too minute to be capable of influencing the sideroscope but sufficiently large to be attracted by the magnet. **Weekers** remarked, that notwithstanding the excellent means at our disposal for revealing the presence of a foreign body in the eye, it happens now and then

that all procedures are in default, in cases where certain clinical signs prove the presence of a foreign body, such as a hole in the iris or visibility with the ophthalmoscope. Nor can we affirm that a foreign body has been absorbed because of a negative response to the usual methods of diagnosis.

Findlay reports a case of failure of vision in one eye with no history of injury or previous inflammation; a change in the color of the eye was noticed, and spots appeared before the eye. Examination showed pronounced yellow color of the left iris, while the right was clear blue. The pupil reacted, and when dilated, concentric brown pigment deposits could be seen on the entirely opaque lens. An X-ray plate showed a foreign body in the vitreous behind the equator.

Fort writes on foreign bodies, and considers the proper treatment of an eye containing a foreign body as regards useful vision, a safely retained globe, the prevention of sympathetic ophthalmia with loss of vision in both eyes, and enucleation. He cites three interesting cases. **Travis** discusses foreign bodies within the eyeball and those without, and urges the importance of cleanliness, antiseptics and proper bandage.

Pfingst reports four interesting cases of foreign body in the eye shown by X-ray.

LOCALIZATION OF FOREIGN BODIES.—**Titterton**, in discussing his method of localization of foreign bodies in the eye, states that, instead of plates, he often uses films with sensitized emulsion on each side, employing an intensifying screen, which is covered with a fluorescent salt. As soon as the X-ray light strikes the salt, it fluoresces, and it is with this fluorescence that the picture is really made, and not with the X-ray light. One of these intensifying screens is placed on either side of the film; the exposure is only $1/8$ of what it would be with an ordinary plate. If any metallic body is traversed by the X-ray, a secondary radiation is given off and, if the particle is very small and is submitted to the

rays long enough, these secondary rays will blot it out. Foreign bodies situated over a bony ridge can not at times be recognized; he now always makes two lateral exposures at different angles; sometimes both exposures are made upon one plate.

In **Lewis's** case of injury to the eye from explosion, the patient was seen some 8 or 10 hours after the accident; X-rays negative; the cornea in the left eye was torn, there was a hole thru the iris and also thru the lens, all indicating a foreign body within the eye. The right eye was swollen shut, but apparently without involvement of the cornea. Another X-ray plate showed two exceedingly small bodies back of the lens. At the end of a week, the eye was enucleated and the two bodies found with great difficulty. An interesting feature was the difficulty in fixing the eyes in taking the plate, when both eyes are involved.

In **Pyle's** case the eye was struck by a fragment from an emery wheel, followed by traumatic cataract. Under full mydriasis a small V-shaped foreign body could be seen, apparently attached to or near the lower central margin of the iris. A first X-ray examination was negative; a second report stated that the foreign body was so small that accurate localization was impossible, further than that it was situated in the anterior chamber.

Dancey insists on the importance of careful localization of foreign bodies in the vitreous, and condemns the use of the giant magnet without the information so obtained. He believes great harm has been done by its application.

Franklin, Cordes and **Horner** point out the importance of accurate localization of foreign bodies; hypermetropic or myopic refraction must be taken into account: between a high myopia and hypermetropia, the diameters might easily vary 6 mm. or more. Where the foreign body is not magnetic, a most useful adjunct to the usual localization is the fluoroscope, assuming that the foreign body is large enough to be readily seen under the

screen. The following interesting case is reported. The patient complained of severe neuralgic pains in the temples and right side of the face. An X-ray examination localized a foreign body in the right orbit, 2 mm. to the nasal side, 13 mm. above, and 9 mm. behind the enter of the cornea. Vision 8/10 in each eye; fundi, fields and tension normal. A supraorbital incision with careful exploration failed to locate the foreign body; a probe was then introduced into the wound and the relation of its tip to the foreign body was noted with the fluoroscope. The foreign body was seen to move with the eye and when traction was made upon the loose tissues of the lid, leading to the conclusion that the foreign body was either lodged in the sclera or episcleral tissue and nearer the nasal side than was shown in the X-ray. Thus located the body, 9x2x2, a spicule of iron, was readily removed thru a conjunctival incision. Subsequent history developed that 15 years before, a piece of metal had struck the patient over the right eye but had been neglected and entirely forgotten.

Salzer reports his experience with the method of Stumpf for localization of foreign bodies in the eye, by means of two exposures obtained with different positions of the tube, as the basis of simple triangulation. His experience has been favorable to the method, and details of fifteen cases are given as illustrations. **Salus** has written on radiologic localization of foreign bodies in the eye. **Barkan** and **Heflebower**, and **Loughborough** write on the localization and extraction of foreign bodies.

A case of double perforation of the eyeball with lodgement of foreign bodies in the orbit is reported by **Hanke**. X-ray examination with the localizing method of Sweet revealed three small fragments, a little back of the sclera. The eye retained vision of 6/60 with correction for aphakia, after extraction of the cataractous lens.

MAGNET EXTRACTION.—In a note upon the history of the magnet operation, **Haab** finds that the first adequate ref-

erence to the distant action of the magnet in ophthalmic surgery is by Joseph Jacobi in Zehender's *Kl. M. f. A.*, Feb., 1874, thus antedating by four months McKeown's first paper upon the application of the magnet in ophthalmic surgery. Jacobi published experiments upon the eyes of animals, showing the power of the magnet in extracting iron fragments from the vitreous, and recommended its employment for such purpose. Unfortunately this writer did not pursue the subject further. A long interval elapsed until that most valuable force of the magnet,—attraction at a much greater distance—was applied in practice, which force makes it possible in most cases to extract a foreign body from the eye forwards safely and elegantly. **Haab** adds that, when he began his work, he was influenced, perhaps in part subconsciously, by that ancient tale which tells how in the far east, a magnetic mountain was wont to pull the nails out of the ships as they neared that coast, and so caused their destruction.

The elder and the younger **Haab** have removed 370 iron splinters from the interior of the eye in the course of the last 35 years, mostly by the giant magnet, and 243 of these were saved for specimens. When the foreign body had been in the eye only a few days, its color and shape had already been changed by rust, depending upon the degree of hardness, the softer metals rusting more rapidly. The origin of the specimens could usually be determined from their color, size and shape. It is practically always a splinter from a tool that causes the injury, rather than that of another piece of metal upon which the tool is used. The splinters, which had penetrated the eye, varied in weight from 0.001 to 0.10 grams, 40% of them weighing from 0.001 to 0.005. Photographs of a large number of these foreign bodies, which have been removed from the interior of the eye by the magnet, are of much interest.

Dor advocates the removal of intraocular foreign bodies thru a scleral incision in cases in which the entrance

wound has closed. He prefers to use small magnet, and claims that by inserting the tip into the scleral incision near the foreign body the danger of injuring the zonula, crystalline lens and iris is eliminated.

Patton reports that while removing a foreign body with Mellinger's ring magnet, the body had been drawn into the anterior chamber. The corneal incision was made without removing the ring while the current was still on *magnetizing the knife*; the foreign body moved quickly to the point of the knife and remained in that position after the knife was removed, adhering to the lips of the wound, whence it was easily removed with the electrode of the magnet. The reporter has tried this repeatedly with very satisfactory results and practically no loss of vitreous. When using the giant magnet, a Graefe knife can be magnetized by contact with the tip of the magnet for a few minutes; it is then sufficiently magnetized to attract the foreign body, altho not so strongly as when used in conjunction with the inner pole magnet.

Derby lays down a number of rules in the management of injuries to the eye. 1, in every injury of the eye the possibility of an intraocular foreign body should be considered; all suspicious cases should be regarded as positive until the negative has been proved. The site of a perforation is often overlooked; if it be in the conjunctiva covered portion of the globe, it may be so small as to escape discovery, especially in the presence of extravasated blood and serum. 2, extraction of the magnetic foreign body should be performed as soon as possible after the injury. Early extraction requires early diagnosis. Means of diagnosis are: thoro examination, X-ray and magnet. No time should be lost waiting for X-ray reports, and a negative finding may not be conclusive. The one indispensable test for the presence of a foreign body in the eye is the magnet. The smallest current that will do the work is the best; the slightest pain will tell the story. The writer considers the anterior route best except in the case of

larger foreign bodies where the lens is uninjured. Removal of an intraocular foreign body requires a high degree of surgical knowledge and skill, and should be performed only by experts. Many eyes are lost thru unwise and unskillful manipulations.

Arnet has written on the results of 78 magnet extractions in the Zurich clinic. Dancy has a paper on removal magnetic foreign bodies from the vitreous.

In Patton's case, the eye was struck by a piece of steel. For a few days the vision was somewhat impaired but this soon cleared up and the patient had no further trouble for about three months, when failing vision in that eye was noticed. When seen by the reporter, vision was fingers. A large grayish brown mass, having the appearance of an oxidizing metallic substance, was observed in the fundus. Repeated trials with the giant magnet were without results. A knife needle passed down to the object, gave the sensation of metallic contact and succeeded in detaching the same from its position in the sclera. The foreign body was then easily drawn into the anterior chamber and removed in the usual way. The sight was gradually improving. The writer also refers to a case of the same kind reported by Haab. (Corresp. f. schw. Aertz., 1898, p. 270). He mentions another case of attempted removal of a piece of impacted iron from the retina, which he was able to dislodge with the needle, but unable to bring forward with the magnet; The foreign body proved to be nonmagnetic by test of the hammer from which it was supposed to have been thrown off.

In Thompson's case an eye was injured by being struck with a piece of baleing wire; The patient did not think that the wire had entered the eye. The eyelids were swollen, there was pus in the cul de sac, cornea, cloudy with hypopyon. There was a wound $2\frac{1}{2}$ mm. in length in the cornea, about 3 mm. from the limbus. Higher up in the anterior chamber was a round yellowish mass of exudate about 3 mm.

in diameter, in the center of which seemed to be a black spot. On applying the giant magnet to the eye, the mass, together with the iris, was pulled toward the cornea. After several unsuccessful attempts to dislodge the foreign body from the mass, a spatula was placed on the iris near the mass, when the magnet succeeded in freeing the particle from the iris. The foreign body was withdrawn by holding the magnet in contact with the spatula. Four days later the hypopyon had disappeared and the cornea was almost entirely clear.

Marbourg reports the removal by Dr. Neeper of a piece of steel 6 by 2.5 by 0.5, thick at the narrow end, thru the wound of entrance with the giant magnet. The piece had entered thru the cornea to the nasal side of the pupil, and had lodged behind the iris at about its junction with the ciliary body. When the patient was seen 25 minutes after the accident, the lens was already cloudy. **Dabney** reports a case of injury, in which a fragment of steel was removed from an eye, after two years, with a magnet. **Rollet** and **Bussy** report a case magnet extraction after the foreign body had been tolerated for five years.

Craig reports the case of a man struck in the right eye with a chip of steel, and when seen 11 days later hypopyon and iritis with posterior synechiae were present. A foreign body was located in the vitreous by the large magnet behind the ciliary body. This was extracted on the eighteenth day thru a scleral incision. Vision 1/30, J. 8, but with myopia and conical cornea present. This case shows the difficulty of prognosis. It is not easy as a rule to remove a foreign body after eighteen days, and the existence of hypopyon with iritis generally indicates a bad prognosis. The author prefers the scleral incision to attempting to bring the foreign body forward beside the lens, thru the pupil, and into the anterior chamber.

In **Ellett's** case the eye was struck by a piece of steel. There was a small scar on the cornea and lens cap-

sule and well developed lens opacity; but no irritation of the eye. Vision 1/200. X-ray showed a foreign body in the eyeball. The reporter proposed extraction with a giant magnet, and if this failed, removal thru a scleral incision. **Genet** has written on the extraction of intraocular foreign bodies, and **Boussi** on the treatment of foreign bodies in the eye.

FOREIGN BODIES IN THE ORBIT.—**Mercier** remarks that the war has given opportunity of observing numerous cases of foreign bodies in the orbit, establishing the diagnosis and determining the indications and methods of operation. An intraorbital foreign body, if it is at all voluminous, is easily recognized; it betrays its presence at once by symptoms of reaction, to which are soon added quite an assemblage of the most variable signs, according to the damage effected in the orbit by the projectile (exophthalmia, paralysis of muscles, pupillary disturbances, lesions of the optic nerve or deeper membranes). On the other hand, a small foreign body frequently passes unperceived. Radioscopy and radiography are indispensable in these cases, both for determining the presence and the seat of the projectile.

As soon as the diagnosis has been made, the foreign body should be extracted whatever be its size, for tolerance is never definite, and sooner or later grave accidents are likely to arise. The operative procedures recommended by **Mercier** consists in *orbitotomy* with curvilinear incision and stripping the periosteum to the apex, while avoiding the palpebral fissure. The eyeball is then pulled aside and the orbit methodically explored with the pulp of the finger turned toward the eyeball. As soon as the foreign body is felt, it is bared with a canulated sound and extracted with forceps. The orbitotomy is always practiced under local anesthesia; it is preferable to **Krönlein's** operation of bony resection. **Daloz** also writes on orbitotomy in extraction of foreign bodies.

Dobson showed drawings of ocular injuries, one where the X-ray showed

two air gun pellets lodged in the upper part of the orbital cavity, and the fundus examination showed two linear scars in the macular region. V. = 6/18.

Blair's case was a woman aged 31 years. As a child, she fell upon a pocket knife which penetrated the outer portion of the orbit. In time the sight gradually became impaired; there was divergence and ptosis. She suffered from right sided headache, at times with photophobia. Four years ago she sustained a second injury to the right side of her head, following which the symptoms became more pronounced. X-rays showed a knife blade about $3/8$ inches wide and $2\frac{1}{2}$ inches long in the right orbit, just behind the outer border, with the point under the anterior clinoid process. The right eye in divergence, a little patch of field downwards and outwards; vision fingers excentrically at 1 foot. Several operations had been performed within the past ten years for the purpose of correcting the deviation. Cornea is faintly nebulous, iris tremulous, ophthalmoscope shows almost complete optic atrophy. A small vertical linear scar near the outer angle marked the point of entrance of the knife blade.

Krönlein operation was performed Nov. 6, 1919. An incision was made along the outer third of the brow around the orbit to above the upper border of the zygoma, and then backward and downward to the middle of the zygoma, the orbital incision being continued around the outer third of the lower border of the orbit thru skin and superficial fascia only. The anterior end of the knife, $3/4$ of an inch behind the outer border of the orbit, was easily grasped with forceps and withdrawn intact, March, 1920, no pain of any kind. Colombo writes on injuries of adnexae of eyes and their treatment.

GUN SHOT WOUNDS.—**De Schweinitz** reports a case, seen within one hour after the injury, of a shot from a 45 caliber revolver thru the right orbit, at close range. The bullet had entered the left side of the nose on a level with the eyes, had traversed the

ethmoid (shown by the X-rays), crossed the orbit, and was lodged outside its walls to the right and below the apex. Left eye normal. The right eye was markedly proptosed, conjunctiva intensely chemotic and ecchymotic, lids swollen and containing extravasated blood. Cornea clear, shape of eyeball apparently unchanged, and the ophthalmoscope revealed, in typical profusion, the lesions which Lister has described as peculiar to the "grossly concussioned fundus." Sheets and clouds of hemorrhage everywhere; disc only dimly made out, partly covered with blood, and completely surrounded by widespread areas of hemorrhage; some of the blood was apparently preretinal, no free hemorrhage in vitreous; tension normal; eye entirely blind. Within 12 hours the cornea became infiltrated, with increased exophthalmos and pain. Eyeball enucleated; no sign of rupture; tissues of orbit infiltrated with blood; bullet not found. About 1 mm. of the nerve was secured; its coats were intact, altho evidently bruised; there was no avulsion of the nerve from the globe.

Microscopic examination: Anterior chamber is deep and free from exudate; lens normal; iris and ciliary body congested and edematous; vitreous negative. Retina widely detached on one side, and everywhere the seat of extensive areas of hemorrhage, most marked in the layer of rods and cones; in all layers cellular distortion from edema; numerous interstitial hemorrhages thruout the choroid; no lesions of sclera. Optic nerve: central vessels contain a few red cells and many leucocytes; the lamina cribrosa stands out sharply and is accentuated by almost total destruction of the nerve fibers; the fibers which remain exhibit edema, hydropic degeneration, and are infiltrated with lymphocytes and polynuclears. The fibrous septa are also thickly infiltrated. Between the pial and dural portions of the nerve sheath, there is an area of hemorrhage which circumscribes the nerve. The nerve as it enters the globe shows considerable swelling of the nerve head; the fibers

are degenerated, finely vacuolated, and thickly infiltrated with lymphocytes; an occasional polymorphonuclear is visible. The cause of this swelling of the nerve head appears to be an acute inflammatory condition. Evidently in this case, the missile bruised but did not penetrate the eyeball and caused the extensive hemorrhage of retina and choroid; bruised but did not cut the optic nerve and caused a rapid destruction and hydropic degeneration of most of its fibers and a hematoma of the sheath. These conditions also explain the marked papilledema which was beginning to take on the lesions of an acute inflammatory edema.

Winkler cites his experience with 14 cases of powder injuries to the eye, and concludes that the powder alone is not of great danger, but that the violence incident to the injury is usually the most serious factor. None of the injured eyes which were studied by the author showed signs of sympathetic ophthalmia or chemical changes.

A case of penetrating wound with lodgment of a foreign body in the orbit is reported by **Pons y Marquez**. A young man attempted suicide with a revolver applied in the submaxillary region. There was enormous swelling of the lids and chemosis of the left eye. The X-ray showed a greatly distorted bullet in the upper external portion of the orbit, whence it was extracted by forceps thru an incision parallel to the external orbital margin. The eyeball was preserved with good appearance and movements.

In **Yano's** case the eye was perforated by bird shot, 2 mm. to the inner side and below the limbus; the point of exit was 5 mm. below and inward of the papilla; the vitreous was filled with blood, and the retina detached and atrophic. Since paralysis of the muscles of the trifacial was also present, the reporter thinks that the shot, after double perforation, penetrated the inner portion of the superior orbital tissues.

In **Gifford's** first case, a shot was fired thru the left temple with a revolver. Examination showed that the

bullet had entered the left temple about 1 1/4 inches back of the orbital margin; there was considerable blood upon the eyelid and face, and the cornea was ruptured. The wound of exit being thru the bridge of the nose, and the cornea lying about an inch to the side of the line between the wounds of entrance and exit, it was plain that the rupture, which extended entirely across the cornea in a horizontal line, was due to contracoup from behind. The eye was sightless.

In the second case, a bullet entered the left temple, one inch behind the orbital margin, on the line of the palpebral fissure; the X-rays showed it lodged near the outer wall of the right orbit, about as far back as the entrance wound; the right eye was sightless and pushed forward with extensive hemorrhages under the conjunctiva. This eye developed no reaction, and after several months showed practically no atrophy; anterior media clear and fundus covered with connective tissue; no light perception. The cornea of the left eye was broken into several pieces by three or four radial ruptures extending back into the sclera; the eyeball was empty.

In the third case, a bullet from a 32 revolver entered thru the right temple, an inch back of the margin of the orbit, slightly above the line of the lid fissure. The radiograph showed the bullet near the roof of the left orbit about an inch and a half back of its upper margin. The right eye was ruptured very similar to that in case two, there being practically nothing left in the eyeball but a few shreds of uveal tissue and some blood. In both cases the cornea was so thoroly shattered that it seemed as if some of it were actually missing. The left eye showed moderate exophthalmos with very slight motility. Vision, fingers at two feet. Removal of the bullet, which from the radiograph, seemed easy, proved to be impossible. Six weeks after the injury the vision was 20/100, with no further disturbance from the bullet.

In attempting to explain the production of such an injury the query naturally rises: Is the rupture of the cornea due to the impact of the bullet on the posterior part of the globe, or to the explosive effect of the bullet on the soft tissues of the orbit, or finally to the effect of gas blown into the orbit from the muzzle of the weapon? The reporter and Dr. Sanford Gifford inflicted experimental injuries of the kind on freshly killed sheep and dogs and on living animals under a general anaesthesia; these experiments seemed to show that the corneal injury is due to a contusion of the posterior pole of the eye.

In Posey's case, the bullet of a 38 caliber revolver, fired at very close range, struck midway between the eyes, and entering the head thru the nasal bone, was split into two large fragments and a number of smaller ones, either by the bone or by the heavy gold filled bridge of a pair of spectacles. Scarcely stunned by the shot, the patient walked several squares to the hospital, where the left eye was found to be somewhat proptosed, diverged and almost blind. The right eye was unaffected. The fragments of shot revealed by the X-ray were all in close association with the sphenoid bone; the large fragment on the right side was lodged in the posterior ethmoidal cells; the fragment upon the left side had apparently fractured and injured the optic nerve in the foramen, the nerve showing later the characteristic signs of atrophy with vision reduced to hand movements. Several of the smaller fragments were permitted to remain *in situ*. The external wound healed rapidly and at no time were there constitutional or local symptoms other than those referred to.

Bachstetz examined a boy, aged 15, who was accidentally shot with a revolver in the left temple, with exit in the right temporal region. After two weeks, amaurosis with normal appearance of the eyes. Ophthalmoscopically, right eye, a hole at the site of the optic nerve, surrounded by white foci and hemorrhages. Left eye, secondary

atrophy of disc, hemorrhages and white foci, with pigment changes at the macula. The patient died from meningitis four weeks after the injury. The autopsy showed the white foci to be due to necrosis of the retina. The lamina cribrosa was torn all around from the wall of the scleral canal, with the head of the optic nerve dislocated 1 mm. backward within the dural sheath. A synopsis of the anatomic changes in the cases recorded in literature shows that two types of injuries must be distinguished. In type one, the optic nerve with its dural sheath is torn from the posterior pole of the eyeball, which is easily explained by a very intense trauma. Bachstetz's case belonged to type two, in which the dural sheath remains intact. Its explanation is more difficult. Bachstetz points out the diversity of injuries of this type, and the great number of explanations given in the literature. He concludes that in most cases of this kind, it is not logical to speak of an evulsion of the optic nerve, but much more correct to designate it as an atypical rupture of the sclera in the area of the lamina cribrosa, caused by sudden rise of intraocular pressure by the impact. He discusses the supposed mechanism in detail. Key observed a shot thru the right eye with sudden loss of vision in the left eye one month before. The right eye was removed a few days after the accident. On examination by the reporter, the left eye appeared entirely normal, except that the pupil was slightly dilated and reacted sluggishly. Vitreous fairly clear, but a profuse retinal hemorrhage completely covered the papilla, extending inwards, upwards, and downwards about three disc diameters. The macula region was clearly visible but showed early atrophic changes. Vision, fingers at 5 feet nasalwards. An X-ray revealed the bullet in the left maxilla, at the lower temporal angle of the bony orbit, also numerous small fragments of it in the tissues of the left orbit, behind the globe.

Tooke reports three cases of war injury. In the first, one eye was torn to shreds and the other blinded; the for-

mer was enucleated and a large piece of steel removed from the other. Two years after the injury, the man came under Tooke's care. The lids and conjunctiva were normal, movements of the eyeball free with a few powder grains imbedded in the cornea, which membrane presented a scar at the limbus with an underlying iridodialysis—the point where the foreign body entered, and was subsequently extracted. Anterior chamber of normal depth, while the pupil was completely occupied by cortical and capsular remains, into which the iris had been dragged by dense bands of postinflammatory tissue—evidently the results of an intense traumatic iridocyclitis. Tension not soft, light projection good in all directions; skiagram showed about 16 small foreign bodies, varying from 2 to 6 mm. within the orbit. V-shaped needling, cutting thru the band of inflammatory tissues as well as thru the remains of the lens and capsule, was made. One year later, vision equalled 6/12 plus and Jaeger 2.

In the second case, also a war injury, an eye became painful and injected two years after the injury; no evidence of any wound, anterior chamber abolished, pupil inactive to light, tension 60 mg. of Hg.; vision, light perception, while light projection was problematic. Skiagram showed a small foreign body in the vitreous; removal by magnet. The foreign body measured 1 by 3 mm. The soft lens matter was removed, resulting in a clear pupil. Final vision 6/12; tension 23 mg.; nerve moderately cupped with dipping of veins.

In the third case, an eye was blinded 14 years previously. On examination the eye manifested considerable lacrimation but no photophobia; there had been periodic attacks of pain at the back of the eye about once a year since the accident. The cornea presented a small scar; iridodonesis was present, anterior chamber of moderate depth; vitreous filled with coarse opacities, probably broken down particles of lens; optic disc deeply cupped, apparently physiologic; tension normal.

X-rays showed a foreign body in the lower filtration angle, moving about in the aqueous with change in position of the head; the man was accustomed to sleep with his face buried in the pillow, thus accounting for the foreign body working thru the pupil during the night; it was not in the anterior chamber the day previous. Attempts at removal with the magnet failed, probably for the reason, as subsequent examination of the foreign body showed, that the splinter was composed in the main of a tiny central core of steel, the bulk consisting of rust. It was finally removed by a pair of iris forceps. A year later the eye was quiet, complete detachment of the retina was present which doubtless existed prior to operation, and tension was normal. These cases illustrate the advantage of delaying enucleation when possible, even of blind eyes. **Brener's** subject for a thesis is grenade injury to eye.

Pyle reports three cases of gunshot wounds. In the first, numerous small shots were imbedded in the face and eyelids. Slight entropion of one lower lid resulted. A large vitreous hemorrhage cleared in a few weeks, with complete recovery of the vision. The most troublesome sequel is aberrant cilia from the area of the entropion. The second case was a shot in the eye from an air rifle at about 200 feet distance. Profound shock followed the injury. There was a penetrating wound of the left upper eyelid and dense hyphema with blood streaked vitreous. One year later, all objective symptoms had disappeared and the vision increased to 6/12. The third case was also a shot from an air rifle, with BB shot at short range. There was marked contusion of the eyeball and lid and severe subconjunctival hemorrhages. The injury was followed by traumatic cataract; the latter cleared in two small apertures, thru which, with 10 D. lens, vision equalled 6/12.

In **Chance's** case, following an explosion of a dynamite cap with history following the injury unobtainable, the orbital base was found to be depressed,

the fissure contracted, the globe somewhat shrunken; there were no scars perceptible upon the globe. The cornea was clear; anterior chamber of unequal depth; iris bright green. No reflex was obtained from the fundus. At the enucleation, the superficial tissues were densely adherent to the globe, especially over the nasal aspect. The nerve was cut without difficulty, but the globe was held fast in the apex rendering delivery difficult. The tissues were prolonged about 8 mm. like a protruding growth. At the apex of the more or less triangular mass, pus oozed on pressure. On section of the globe and mass, a bent copper cap was found in the pocket containing the pus. The globe was more or less quadrate; no positive cicatrix could be seen, but the muscles and orbital tissues had been lacerated and were massed together in the posterior and nasal aspect without including the nerve. The almost globular crystalline lens had been dislocated, and the choroid and retina detached and shrunken. The child made a good recovery.

Gibson reports three cases of war injuries from high explosives. The first was a traumatic cataract with dense occluding remains of lens and capsule in pupil. Needling gave 6/9, partly, with correction. The other eye had to be enucleated. In the second case, siderotic spots on cornea and lens were disappearing after removal of small steel particles which had been imbedded thirty months. In both eyes the choroids were ruptured: One eye gave vision of 6/9 plus, the other fingers at a yard. The ruptures were due to "contrecoup." The third case showed double traumatic cataract with dense remains of broken up lens, and capsule occluding both pupils. Needling gave 6/9 vision in one eye; left opacity still very dense in spite of two needlings, but further needlings promise good results, provided the fundus is uninjured.

Guyonnet's statistic study is based upon 5,028 cases from the service of Prof. Rollet. From the point of view of their frequency, Guyonnet classifies

war injuries as follows: shells 50%; trench weapons 23%; bullets 16%; gas 7%; shrapnel 1%; bayonet 0.13%; various explosions 2.40%. Shells and trench weapons act either by the air or their own fragments, or projections of earth, wood or stone. Bullets act by their direct effect or by their fragments. Gases but rarely cause severe lesions. Ocular lesions are very serious from the point of view of function; the eye is destroyed in 32% of all cases; the vision is less than 1/20 in 27%; it lies between 1/20 and 1/10 in 4%; in 37% it is above 1/10. **Bab** reports that of all war blind reported to the German War Blind Appropriation for Army and Navy up to May 15, 1920, viz., 3,122, 2,677 were due to injuries (83.4%), 445 to diseases (16.6%). Of the injuries, 1,848 cases were caused by artillery projectiles and explosions, 667 by rifles, 162 by other forces. Up to Dec. 10, 1920, the number of cases had risen to 3,526.

AVULSION OF OPTIC NERVE.—In **Mohr's** case a blow upon the eye caused intense pain and loss of consciousness. When seen four days later, vision nothing; subcutaneous hemorrhage of both lids, conjunctival injection; pupil dilated, slightly elliptical and fixed; numerous floating opacities in the vitreous; fundus indistinctly seen but showing a whitish zone with injected region in the neighborhood of the papilla, raising the suspicion of choroidal rupture; tension normal. The site of the papilla shows an unusually well defined border of grayish color. There is a deep excavation extending backward perpendicularly; no vessels visible at the site of the former papilla and its immediate neighborhood. Surrounding the cavity, a whitish zone is visible extending outwards more than one-half disc diameter, somewhat narrower inwards but widest downwards, about one disc diameter. The zone is bordered upwards and inwards by hemorrhages, in other aspects by slightly obscured retina. No deformity appears in the margins of the bony orbit or in the orbital walls. A few days later, a nearly cir-

cular hole 8 to 9 D. in depth, with sharply defined margins, was visible at the site of the optic disc. The color of the cavity was greenish gray, in spots slightly reddish. Surrounding this hole is the above mentioned whitish zone. Parallax movements of this zone upon the surrounding retina are apparent, so that the zone appears to lie further back, and to a certain extent foreshortened. The difference in level between the retina and the zone is about 2 or 3 D. The skiagram suggests a fracture in the floor of the orbit, but not extending as far as the optic foramen. Ten days subsequently the ophthalmoscopic picture underwent a change: three fine gray concentric rings appeared in the temporal side of the peripapillary zone; these rings as proven by parallax displacement evidently form a gradual incline from the retina to the margin of the hole. Behind the upper edge of the excavation a quasisegmented, tense membrane now became apparent, having sharply linear free margins white in color. This membrane became wider within the following days.

After a brief sketch of the views of other writers as to the *modus operandi* of avulsion of the optic nerve, the reporter comes to the following conclusion as to the mechanism in his case. The patient had a typical tower skull with bilateral exophthalmos, with markedly shortened orbits. The conditions in this form of skull, as anatomic observations show, are sometimes such that the optic nerve is held very tightly in the narrowed foramen, thus greatly limiting its motility. The orbital portion of the nerve forms in many cases with the intracranial portion, as a consequence of the lower position of the sella turcica, an angle open downwards, a circumstance which further limits its mobility. Finally in tower skull, the distance between the optic foramina is greater than normal, which adds a certain rigidity and loss of elasticity to the nerve. When the exophthalmic globe was struck by a tangential force, its posterior segment must have been strongly rotated to-

ward the right; the nerve tightly enclosed in the optic foramen was unable to yield; it suffered violent traction at its point of entrance into the globe; to this traction at its bulbar extremity was added greatly increased tension at the moment of impact, sufficing in a youthful subject to rupture the lamina cribrosa and press the optic nerve backward. The sharp margin of the hole, its depth and later ampullar enlargement indicated that the optic sheath was not torn, but only the nerve which glided backwards within the sheath. If the sheath had also been ruptured, there would have been no hole noticeable, as it would have been filled with the orbital contents and the eyeball would have collapsed.

Coppez reports that following resection of the middle turbinate bone, there was severe hemorrhage; this was arrested by plugging the nostril. Some days later, on opening the maxillary sinus by the nasal route, a large quantity of pus escaped. Immediately after the latter operation, tumefaction, immobility and protrusion of the eyeball occurred, with abolition of vision. Some days later, curettage of the ethmoid showed that it contained three tampons of wadding. The pain continued with exophthalmos, ptosis, immobility of the eyeball and pupil, and vision was abolished. Upon ophthalmoscopic examination, the papilla had disappeared, being replaced by a continuous white plaque; certain indistinct branches of the central retinal vessels reappeared at a distance of two disc diameters from the papilla. In the course of the above operation, the inner wall of the orbit had been perforated, causing avulsion of the optic nerve. Doyme also reports avulsion of the optic nerve.

INJURIES OF THE TRIGEMINUS AND SYMPATHETIC NERVES.—Cords reporting rare nerve injuries by gunshot wound includes three cases of injury of the trigeminus. A wound in the temple from explosion of a hand grenade caused complete paralysis of the first, and partial paralysis of the second division of the trigeminus nerve, with

herpes zoster in a distribution of the latter, and a mild neuroparalytic keratitis appearing on the 12th day after the injury. His second patient suffered a gunshot wound passing from the right cheek to the left temple. There was complete paralysis of the second branch of the right and first branch of the left trigeminus, and incomplete paralysis of the first branch of the right and second branch of the left. Complete anesthesia of both eyes. Bilateral neuroparalytic keratitis, and bilateral injury of the optic nerve, with central scotoma. His third case arose from injury of the sphenoid with partial avulsion of the left, and complete laceration of the right optic nerve and left trigeminus.

Two cases of paralysis of the sympathetic are given. The first was from injury by a fragment of grenade behind the left external ear, involving the left cervical sympathetic and carotid, with severe secondary cerebral disturbance. The other patient, struck by a fragment of a grenade in the forehead and left cheek, developed paralysis of the right side of the body, right optic nerve, aphasia, alexia, agraphia, and sympathetic paralysis of the left side.

Cords also includes temporary oculomotor paralysis from contusion of the calvarium. He also records a case of grenade wound of the right forehead and frontal sinus. The X-ray showed fragments in the root of the nose and right orbit and one posterior to the left clinoid process, involving the optic tract, and causing right hemianopsia. In another case of multiple wounds of the face, the radiogram showed a fragment 1.5 cm. behind the clinoid process, and there was complete loss of the temporal halves of the field.

AUTOMUTILATION.—**Landolt** considers self inflicted eye injuries. For the conjunctivitis provoked by the application of soap, a white precipitate forms (probably oleomargarat of zinc) when a drop of 2 1/2% solution of sulphat of zinc is instilled into the eye. Conjunctivitis is rarely induced by cigarette ash compared with that

due to ipecac. For the conjunctivitis caused by the castor bean, the appearance is characteristic: a white eschar sharply defined, covered by a thick false membrane, consisting of two parts which exactly correspond to each other, on the bulbar and on the palpebral conjunctiva. The writer refers to a white speck on the cornea, artificially produced and rendered opaque by acetat of lead. A remarkable case was one of self inflicted perforation, twice produced in the same eye with a penknife; the wound was about 1 1/2 cm. in length, straight and vertical, exactly across the limbus in the middle and below. The purpose was to cause a traumatic cataract to escape military service.

Seefelder reports ocular injury thru self inflicted shot wounds.

BIRTH INJURIES.—In **Komoto's** case an eyeball was luxated during birth, due probably to an impediment in the parturient canal, as the child had upon the hip of the same side a large swelling, which proved to be a lymphangioma. It was alleged that the forceps had not been used. The luxation was probably caused by intraorbital hemorrhage, as incision showed a large collection of blood. The author reports the luxation of the eye of a man from contact with the stump of a tree. He also relates an instance of spontaneous luxation of the globe which was astonishingly well described in an old Japanese book, and the cause given as congenital relaxation of the muscles.

GENERAL PAPERS.—**Lindner** highly recommends a readily applicable surgical device in all cases of recent wounds of the eye lids. This little operation seems not to have been applied or noted in these cases, but its beneficial effect is apparent in furthering ideal healing without those disturbing and disfiguring notches, which result so frequently from such wounds. The operation consists in dividing the external palpebral ligament and fascia, either immediately preceding the suture in case of marked exophthalmos in consequence of orbital hemorrhage, or at any rate following the same. The op-

eration is best performed, where there is no exophthalmos or marked swelling of the palpebral tissues, by section of the part with a small straight pair of scissors. A vertical cut about 1/2 cm. in length is made thru the skin, slightly external to the outer canthus; the latter is then drawn aside by toothed forceps to render the ligament tense. The scissors are inserted beneath the skin, and all connective tissue strands extending from the lid to the orbital margin are divided; following the section, the external angle of the lids should be readily movable as far as the center of the cornea. In cases of marked exophthalmos, or great swelling of the divided portions of the lid, a provisional canthoplasty or a vertical 2 to 3 cm. long cut in the skin should be practiced for the relief of tension. The above operation will almost invariably permit perfect union without any notches. The author also recommends for all sutures of the skin, especially in plastic operations, horse-hair; the latter while not so pliable as silk, and inclined to cut out, has the great advantage of being readily sterilized and does not irritate. Such sutures may be left for a month or more; they will be found as dry and free from all irritation as when first inserted. The writer notes that this material has been used in America for 20 years in certain operations. He finally observes that while the above method has been very generally applied to relax the parts in plastic operations upon the lids, he has never seen or heard of its use in immediate suturing in injuries of the lids. Six illustrative cases are given.

A boy, aged 9, received a blow on the occiput; the next morning there was vomiting and loss of consciousness which returned in the evening with blindness of both eyes. Ptosis and ophthalmoplegia of the left eye, pupil wide, immovable, fundus showed nothing abnormal. After two weeks the discs commenced to grow pale and after three weeks there was total atrophy of both optic nerves. **Mertz-Weigandt** assumed a fracture of the

base of the skull, with a hemorrhage, after 16 hours, at the sella turcica and behind the left supraorbital fissure, which by compression of the oculomotor nerve and the other motor paths, produced the ptosis and lack of motility. Also a hemorrhage into the optic sheath was surmised, because the compression of the motor paths soon subsided with the general symptoms elicited by compression, while the amaurosis remained.

In **Fagin's** case a blow on the head was followed by failing vision. In six weeks both eyes had become blind without light perception. Both pupils were slightly dilated and entirely immovable. The fundi appeared normal except that the nerve heads were white and bluish in tint but not typically atrophic; blood vessels normal in appearance. The question in this case is whether the injury to the back and side of the head could have caused the blindness.

De Lapersonne reported a case of meningitis which followed a perforating wound of the cornea. The patient was a boy 13 years of age. The author saw the case ten days after the injury, at which time there was panophthalmitis and beginning meningitis. An exenteration followed by curettage and electrocauterization was done, but the meningitis gradually became more severe and the patient died 12 days after the operation. Pneumococci were found in pure culture in the cerebrospinal fluid.

Lehmann reports a case in which laceration of the eyeball was followed in three days by phlegmon of the orbit, and two days later similar involvement of the other orbit. The patient's death raised important questions with regard to accident insurance.

Norrie calls attention to the bad effects of coal brickets on the eye.

Campbell and **Carter** give a synopsis of 105 personal cases of industrial injuries to the eye. Emery grinding, steel or metal work were responsible for 81.3% of the total number. Major injuries, such as perforating wounds, with and without retained foreign bod-

ies, third degree burns, and rupture or detachment of the coats, constituted 7.9%, the percentage being highest in the metal group. X-ray was of the greatest importance in diagnosing or excluding the presence of a foreign body. They were able to remove magnetizable foreign bodies in 95% of the cases in which they were present. Great importance is attached to immediate iridectomy in prolapse. 23.8% of the cases in which the operation was performed had normal vision; 68.5% of the eyes in which the sight was lost had to be enucleated. Great stress is laid upon early diagnosis and treatment.

Various ocular injuries are described by **Strebel** as due to *skiing*. Rupture of the inferior oblique tendon from its insertion at the beginning of the lacrimal canal, resulting in a permanent paralysis and contraction of the visual field upward, contusion of the outer rectus with subconjunctival ecchymosis, and commotio retinae resulting in uncrossed double vision fracture of the orbital bones, and rupture of the periosteum and Tenon's capsule may result. Cases are reported, one with rupture of the choroid and involvement of the macula.

Bodard reports 33 cases of detachment of the retina from war injuries, from the service of Prof. Rollet. The author ascribes the mechanism of the occurrence to the following five agencies: Raising of the retina from hemorrhage; posttraumatic retraction of the vitreous; cicatricial retraction of wound of the eyeball; sudden diminution of volume of the globe; tear of retina.

Passera has published a monograph of 62 pages dealing with ocular trauma-

matism in the army, and **Rumbaur** has written on the same subject.

Buchanan finds from an analysis of three years service in the Glasgow eye infirmary, that injuries to the eyes of children were of increasing frequency. In fact, the list indicates that the loss of eyes from injury may even exceed that resulting from ophthalmia neonatorum in the community which this hospital serves. A table of the causes of injury shows that the majority are preventable. As young children are fully as liable to sympathetic ophthalmitis as adults, it is wiser to err on the safe side and to remove any child's eye which is injured in the ciliary region. **Storck** takes up ocular injuries in infants in the Tübingen clinic from 1912 to 1918. **Caillaud's** book "Guide du Medecin Oculiste dans les Accidents du Travail" is based upon an exceptionally large material. It is intended as a guide to the practitioner in estimating the damage to the vision actually sustained with a view to compensation, of course according to the jurisprudence of France. He refers particularly to two classes of subjects, one of which is intent on minimizing the effects of the injury from fear of losing their situations and a second class who exaggerate in order to obtain the maximum compensation.

Mulgund has issued a small book on traumatic lesions of the eye and orbit, in which he presents the general principles of treatment. He suggests that in every compound fracture of the orbit as well as in extensive injury to the soft parts, in which contamination with soil cannot be excluded, a preventive injection of tetanus antitoxin should be given.

General Pathology

EMORY HILL, M.D.

RICHMOND, VIRGINIA.

This review of the subject carries the literature from December, 1920, to October, 1921. For previous references, see O. L. v. 16, 1920, p. 307.

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DIGEST OF THE LITERATURE.

HEREDITY AND RACE TENDENCIES:

Audry divides heredity eye diseases into three types: (1) direct, manifesting itself in certain malformations and in hemeralopia; (2) material, such as color blindness and optic atrophy; (3) fraternal, such as albinism and retinitis pigmentosa.

Bayle and **MacAuliffe** find that chestnut hair predominates among the French people, who are a mixture of northern and southern races. They describe the eyes as strongly pigmented in 38.87%, slightly pigmented in 42.52%, and unpigmented in 18.58% of 6652 subjects examined. **Bouman**

from studies of scholars in Amsterdam, concluded that Alpine traits predominate over Teutonic where the races are mixed, Alpines being more resistant to life in large cities.

Buchanan has attempted to establish the heredity of migrain, in the strict sense of the term. He reports observations on 1300 persons comprising 127 families. One group consisted of the offspring of 100 families, in which father or mother had migrain: 143 children were affected and 488 were free from migrain, a ratio of 3.13 to 1. A second concerned the epileptic offspring of parents with migrain: 7 fam-

ilies had 10 children with epilepsy alone or a migraine—epilepsy syndrome, and 37 children without migraine or epilepsy, a ratio of 3.7 to 1. A third group consisted of the crossing of persons with dormant migraine: of 17 families in which father and mother did not have migraine but a brother, sister, father or mother of the parents had the disease, 30 children had migraine and 85 did not, a ratio of 2.83 to 1. A fourth group consisted of 3 families in which both parents had migraine: of 15 children, all had migraine. The groups total 198 children with and 610 without migraine, which corresponds to the Mendelian ratio. Buchanan concluded that migraine is an inherited disease in the strict application of the word, and that therefore no treatment can prevent or cure it.

Inbreeding from a Holstein-Friesian bull resulted in 8 cases of stellate congenital cataract, as described by Small (O. L., v. 16, 1919, p. 141) in 8 out of 63 descendants in the second generation. No evidence of cataract were found in his ascendants. **Detlefson** and **Yapp** conclude that cataract is recessive in cattle. Mating the cows to normal unrelated bulls should reduce the cataractous offspring to a negligible minimum.

Usher, after studying albino eyes anatomically, thinks that the theory of albinism suggested by Meckel and Mansfeld, namely that it is an arrested development, is not correct. But other causes may operate to lessen pigmentation. He found the retinal pigment present in albino eyes, but in less quantity than the normal. Mesoblastic pigment was absent in the iris, ciliary body and most of the choroid, only a few cells in the macular region containing pigment. The maculae showed several layers of ganglion cells and had a yellow color in the freshly removed eye; but there was no fovea; this he takes to account for the defective vision of albino eyes, rather than the deficient pigmentation. In general, the dark races seem to have mesoblastic pigment developing earlier in

fetal life, and in larger quantity at the time of birth.

Fleischer writes an introduction to a series of articles dealing with heredity in retinitis pigmentosa, cataract, corneal degeneration and optic atrophy, which are reviewed in appropriate places in *Ophthalmic Literature*. He calls especial attention to the pioneer work of Nettlehip, which is a model of such research.

ANAPHYLAXIS AND SEROLOGY. **Baldino** concludes that heterologous serum does not pass from the blood serum into the anterior chamber. His experiments consisted in removing the aqueous humor from the rabbit's eye, making deep scarifications of the posterior surface of the cornea at the same time, and then injecting beef serum into the anterior chamber. Two weeks later he injected the same serum intravenously into the rabbit, and removed the aqueous making similar scarifications. The second reaction was no greater than the first. He infers that the ciliary epithelium acts as a dialysing membrane, keeping back the substance in a heterologous serum which produces anaphylaxis. **Guglianetti** had obtained anaphylactic reactions, local and general, after injecting aqueous into the blood stream of animals previously injected with aqueous from the same animals. He assumed that an animal's own serum passes into the aqueous after paracentesis.

Kodama, experimenting with guinea pigs, tested the reaction to horse serum, to see what effect anaphylactic reactions would have on smooth muscle in the lids and iris, blood vessels of the lids, conjunctiva and fundus, and the reactions of the lacrimal and Harder's glands. Horse serum applied to the eyes of normal and sensitized guinea pigs produced widening of the palpebral fissure and of the pupil, succeeded by contraction; the response was more prompt and vigorous in the sensitized animals. He attributes the primary result to stimulation of the tarsal smooth muscle and the dilatator smooth muscle of the iris, effects which are increased as a result of asphyxia

in cases of anaphylactic shock. Loss of tonus follows with secondary narrowing of the lid fissure and pupil, the latter probably increased by the action of the sphincter, together with congestion of the iris. Anaphylactic intoxication with horse serum produced circulatory disturbances, with edema and congestion of the lids, conjunctiva, iris and fundus, and hemorrhages of the epibulbar and retinal vessels. Hemorrhage occurring independently of asphyxia, he attributed to direct action on the vessels. The lacrimal and Harderian glands were stimulated more in sensitized than in normal animals. An anaphylactic death, the pupils were quickly and strongly contracted.

Trubin, experimenting to test the views of Elschnig and Igersheimer regarding sympathetic ophthalmia and parenchymatous keratitis; found the reinjection of the vitreous of the ox or sheep in prepared animals caused corneal lesions, but different from those produced by disease.

Pfeiler and **Nussbag** used trypanosome extract, dropped into the eyes of horses, to establish the disease when symptoms were indefinite. They produced reactions in the form of conjunctival injection and secretion, with pus in the tear passages. Subcutaneous injection gave similar results.

REACTION ABOUT TISSUE TRANSPLANTS: **Fleischer** transplanted iris, cornea and lens of guinea pigs into pockets in the abdominal wall of guinea pigs, and studied the resulting tissue changes at intervals of from 1 to 42 days. He found similar reactions about auto- and homoiotransplants, but in greater degree in the latter in the case of iris and cornea. The lens transplants, on the contrary, showed no difference between those placed in the same animal and in another animal. Assuming a degree of foreignness in the tissues of another animal of the same species, allowing greater reaction in a homoiotransplant, the absence of such difference in the case of the lens accords with the generally recognized organ specificity of the lens, which ap-

pears to possess no species specificity. **Fleischer** thinks that epithelial tissue does not attract lymphocytes as does connective tissue.

CYTOLOGY.—**Brückner** has contributed an exhaustive study of cell forms in the ocular tissues and fluids in the course of inflammations, both in stained sections and in smears made from vitreous and aqueous contents, and subretinal exudates after withdrawal by puncture. This paper was delayed by the cessation of communication with Germany during the war. His conclusions are largely confirmatory of the accepted views in the literature of general pathology, but contain a few important observations on the function of certain cells in the eye. He finds evidence of extensive sharing of local tissue elements in inflammatory processes, as the corneal endothelium and ciliary pigment cells. The eye lends itself to examination in toto anatomically; therefore the participation of hematogenous elements in inflammatory material is more easily determined here than in other body cavities. The characteristics of blood lymphocytes are found in exudates in the eye, and he shows that lymphocytic small cell infiltration is in the main hematogenous. So-called large mononuclears are partly from the blood and partly from local tissue, belonging to Aschoff's classification of histiocytes.

In eyes with exogenous trauma (not specific), the cells occur in the following order: first neutrophiles, later lymphocytes. Large mononuclears are not so definitely determined. Neutrophiles act as microphages, lymphocytes as macrophages; large mononuclears as both. Tissue cells likewise possess both properties. The sharing of ciliary epithelium in the production of inflammatory cells is parallel to the similar conduct of glia in the central nervous system. The analogous position of the ciliary epithelium to the ependyma of the ventricles suggests a similar function for the latter. In the eye chambers, free glial cells were not found, tho this possibility is to be considered. The pars plana of the cili-

ary body produces a great part of the inflammatory exudate in the vitreous. The iris has a large share in the resorption and perhaps the formation of intraocular fluids, especially the pupillary part with its capillary network.

Fischel found that after blinding certain larvae of amphibians, there was an increase in the amount of pigment over the entire animal, especially when it was kept in the light.

GENERAL.—**Jackson** calls attention to the unfortunate separation of pathology as a study of dead tissue from the daily work of the clinician, and urges the use of the ophthalmoscope for the study of pathology of living tissues. He cites numerous examples of the eyeground pictures of important disease conditions bearing upon general disease processes.

Zimmermann agrees with Wintersteiner that most *pigment flecks* in the conjunctiva are nevi, and that it is exceptional for simple pigmentation to occur without other tissue changes. His histologic studies confirm this view. The pigment is primarily in the epithelium, especially the basal layer, and not in the connective tissue. His case showed no evidence of malignancy, but the histolitic and wandering nature of the pigment cells raises the question of melanosis being at times basal cell cancer.

In discussing a case which Asher reported as having a peculiar opaque ring at the margin of the pupil, and which he thought was due to the presence of blood between the lens and hyaloid membrane, **Hamburger** claims that the explanation is not logical, and attempts to prove his contention by comparing the posterior chamber with other cavities in the body, and by experimentation. **Hamburger** concludes that it would be impossible for blood to lodge between the lens and hyaloid membrane without the presence of blood in the posterior chamber; and that the hyaloid membrane and the iris are in close apposition to the lens and cannot be separated excepting by some internal force, such as filling of the posterior chamber with blood, etc.

OCULAR NERVE SUPPLY. **Boeke's** elaborate experiments on the degeneration of nerves concern in part the ocular nerves. He made use of the cat, sectioning the trochlear and abducens, and treating the ocular muscles by Bielschowsky's method. He believes that the nerves supplying the ocular muscles are mixed nerves, both motor and sensory, as Sherrington has stated. In addition, he finds an independent system of nonmyelinated fibers belonging to the cranial autonomic system of Langley. A small part belong to the sympathetic in the narrow sense of the word. Thus, the ocular muscles are connected in a twofold manner with the autonomic system.

TRANSMISSION OF DEFECTS.—**Guyer** and **Smith**, continuing experiments previously reported, in which pregnant rabbits and mice were treated with fowl serum sensitized to crystalline lens of rabbits and mice, find the defects produced in successive generations to the sixth. The defects are such as are not otherwise found in these animals. The lenses became opaque wholly or in part, and were reduced in size; the irides did not exhibit normal reflexes, and were discolored and frequently cleft; persistent hyaloid artery was common. The abnormal development sometimes increased until the end result was extreme microphthalmos. The lenses of the mothers were not affected, presumably because there is no vascularity of the lens capsule after fetal life. The defects were of the Mendelian recessive type, becoming worse in succeeding generations, and involving a greater proportion of the young.

Wessely attempted to refine upon the methods of altering the growth of the eye in new born animals, so as to obviate the factor of excessive trauma. In this way he hoped to determine whether there is a definite correlation between abnormally sized eyes and the surrounding tissues. After a discission of the lens in a guinea pig 12 days old, in 24 hours there was increased tension and the globe soon showed evident enlargement. Later a high

grade buphthalmos developed. The animal was killed after 2 1/2 months. The cornea measured 5 mm. more than the normal for this age. Similar results occurred in a second animal. The eye muscles were 2 mm. wider than the normal, and the orbit 4 mm. larger in all diameters.

From 16 experiments, he concludes that excessive volume of the eye during the period of growth produces corresponding growth of the orbit. The same occurs clinically in man, but is especially true of the guinea pig, in which the fat behind the eye is scant, and the muscle cone about fills the orbit. After a careful dissection in a puppy 2 weeks old, avoiding excessive swelling of the lens, complete absorption occurred. The eye was smaller in all dimensions than the fellow eye. Six months later the animal was killed. The equatorial diameter measured 2 mm. less than that of the fellow eye and the orbit was 2 mm. narrower in all dimensions. Massage cataracts produced in guinea pigs led to the same results. From 18 other experiments in guinea pigs, he concludes that small lenses produce small eyes and correspondingly small orbits. Wessely believes that there is a definite correlation between an organ and its surroundings to fit form to function. He does not think that merely mechanical effects explain this correlation. His reasoning is difficult to follow; apparently he infers a teleologic process which savors of the metaphysic.

Lindberg discusses the question of the identity of congenital defects and those produced by subjecting animals to poisons. Pagenstecher believed the two results identical; von Szily has disputed this belief. Taking coloboma as a typical congenital anomaly, there appears to be but one coloboma pro-

duced in 579 cases subjected to naphthalin poisoning, in the series of these two authors. Lindberg believes that experimental colobomas are not the same as congenital anomalies. His own 18 experiments with B-naphthol injected into pregnant guinea pigs led him to conclude that the damage to embryos is a direct poisoning from naphthol. The drug appears only in the last days of pregnancy in the amniotic fluid, but always appears in the embryo's blood and the mother's blood. He suggests that the use of this agent opens further possibilities of studying experimentally the communication between the maternal organism and the fetus.

MOUNTING SPECIMENS. *Technic.*—Schall claims for his method of gelatin mounting of eyes the advantages, without the disadvantages, of the celloidin method. He hardens the globe in formol, followed by gelatin with carbolic acid as a preservative, cooling in the refrigerator, and finally using formol again. The freezing microtome is used, followed by the usual staining, dehydrating and mounting.

PUPIL REACTIONS. McGuigan recommends the following procedures for demonstrating pupillary reactions: anesthetized dogs are utilized, mydriasis being produced by stimulating the central end of the cut vago-sympathetic; miosis is produced by stimulating the ciliary ganglion after exposure thru a resection of the outer wall of the orbit, the ocular muscles being severed to prevent movement of the globe. He also uses the enucleated eye with its muscles kept in warm saline solution, stimulating the cut ends of the long ciliary fibres about the optic nerve. Similar demonstrations may be made after the use of drugs which modify pupillary reactions.

Ocular Lesions of General Diseases

BEN WITT KEY, M.D., F.A.C.S.

NEW YORK.

This review of the subject includes the literature from December, 1920, to October, 1921. For previous references see O. L. v. 16, 1920, p. 310.

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DIGEST OF THE LITERATURE

MEASLES.—The ocular complications of measles are so commonly met with that they are frequently disregarded by laymen, and regarded by the physician as only mild symptoms of a general disease, but **Fernandez** points out how, unfortunately, measles is capable of producing very grave complications, such as invasion of cornea with *keratitis punctata*, as studied by Trantas, and also by Morax. Sometimes the progress of the corneal lesions is rapid and destructive to the globe. The disease may attack the optic nerve, as in the cases of Vancreson, Griscom, and Santos Fernandez. He reports three cases, typical of hundreds of others occurring, in benign measles,—one case, 7 years old, of permanent central macula of cornea following a virulent pustule; second case, 1 year old, of *panophthalmitis* from suppurating keratitis during measles; 3rd, young man, case of *optic neuritis* and useless vision. **De Salterain** reports that in 426 children with measles and showing certain ocular disturbances, fifty-five cases showed ocular affections of the common type, and most of these rapidly subsided with ordinary treatment. In three cases there was severe keratitis, but parenteral injections of milk cured the outstanding symptoms at once.

SMALLPOX.—**Fleck** reports a case of *disciform keratitis* occurring during the course of smallpox, in a girl who had a foreign body of the cornea about the time the smallpox was contracted. He reviewed similar case reports and the literature of the subject, and states that, in his opinion, corneal changes occurring in the progress of a case of smallpox are the result of secondary infection, and that the corneal reaction is less severe because of the previous systemic reaction to the same toxin. Indications are that disciform keratitis secondary to smallpox is a specific inflammation, probably as specific as the pustule itself.

ERYSIPELAS.—An unusual case of erysipelas is reported by **Cooper** in a patient of 28 years, poorly nourished. He had fever previous ten days, large areas of erysipelas on right thigh, left eye became entirely blind, lesion not stated. Usual local treatment and large doses of antistreptococcic (erysipelas) serum injections; 8 injections were given. Liq. ferri perchloridi was prescribed 4. t. i. d. The erysipelas subsided and the eye was completely restored. **Junius**, also reports a case of bilateral blindness after facial erysipelas, in a man 30 years old, involving

the eyelids, and producing *optic nerve atrophy* and marked retinal changes in the right eye; and in the left an abscess of the vitreous. He believes the causative organism produced a meningitis involving the motor centers (as shown by a temporary paralysis of the right arm and leg), thus affecting the optic nerve and retina of the right eye. The retinal changes were of great interest, as here the radial striae were visible in the region of the macula. The formation of these striae have been discussed by several authors. Junius believes that in his case they were small folds of the membrana limitans externa.

DIPHTHERIA.—A case of diphtheria of the eye, ulcers of the conjunctiva and cornea, from which the diphtheria bacillus was isolated, is reported by **Tiling**. Several other cases similarly affected were discovered by him on careful clinical and laboratory examination. None of the cases showed any nasal or laryngeal diphtheria whatever. Simple local treatment and anti-diphtheritic serum injections cleared the condition rapidly.

TYPHUS.—In a study of 244 cases of typhus, **Arnold** found *optic neuritis* to appear as a late symptom in fifty-nine per cent of the cases. It can be made out definitely on the 10th to the 12th day, at the time the fever is going down by lysis, and the skin lesions have more or less completely disappeared. The optic neuritis is coincident with the appearance of the positive hemolysin reaction in the cerebrospinal fluid. Favorable prognosis. **Ischreyt** reports a case of *metastatic ophthalmia* during the course of a case of typhus, in which metastatic abscesses appeared on various parts of the body, panophthalmitis and enucleation followed; later, the other eye was involved in like manner; death followed from sepsis.

MALARIA.—The effect of the tertian malaria in the blood upon the central nervous system and, especially upon the eye itself, is demonstrated by the case of **Van Driel**, who relates the following: A corporal fireman in Dutch East Indies, having a malarial history, was seized with convulsive attacks every 3 to 4 days, with fever, headache

and vomiting, clonic contractions, tremors of the lids, paresthesias, drowsiness, pulse regular, 100; urine, trace of albumin, leucocytes and epithelial cells. There was slight paralysis of the frontal and levator palpebrae muscles; on closing the eyes tightly, marked *tremor of the right eyelids*; right palpebral fissure very narrow, the left remained closed; no deviation in ocular movements or pupils, but the right a little smaller than the left, tho both react to light. Ophthalmoscopically, double *choked disc*, with point like hemorrhages in right eye, larger hemorrhages in left eye. Diagnosis of brain tumor. Subsequently, the sclera became subicteric, and examination revealed enlarged liver and spleen, and in the blood malarial parasites of the tertian form, and in the urine much "malaria" pigment. Quinin was administered with rapid subsidence of ocular and other symptoms.

INFLUENZA.—**McNabb** discusses ocular lesions of influenza, pointing out conjunctivitis as the one commonly recognized during the disease. Several cases of cyclitis; iridocyclitis following cataract extraction he believes due to influenza; also double optic neuritis; tenonitis, paralysis of 6th and 3rd nerves; a case of orbicular abscess, meningitis and death, and numerous cases of asthenopia.

Bresler reports, under ocular sequelae in influenza, *paralysis of the external ocular muscles* and of the sphincter iridis as results of nuclear involvement; the prognosis favorable. Three cases are related by Pichler of acute paralysis of the abducens of both eyes, due to influenza and rapidly cured by profuse sweating treatment. **Penichet** publishes personal observations of ocular complications in influenza, 12 cases of conjunctivitis, 9 lacrimal infection, 4 ulcer of cornea (pneumococci and influenza organisms cultivated from ulcer), 5 panophthalmitis but all of metastatic origin, and not from perforation of cornea, as reported by others; one abducens paralysis; 4 paresis of accommodation; 2 retinal hemorrhages; 3 retrobulbar neuritis.

Torres Estrada reports 18 cases of ocular complications following typhoid

and influenza, in which he discovered syphilitic antecedents, and in which the complications yielded readily to anti-specific treatment. He believes that the typhoid and the influenza alone had awakened in these cases a latent *syphilis*, and impresses the necessity of searching for syphilis in patients who present ocular complications in chance infections. Diseases of the eye following influenza is the subject of a paper by **Waldmann**.

Augstein states that besides the types of *conjunctivitis* and *blepharitis* so common in gripe, he has noticed frequently small abscesses of the lids, *dacryocystitis* less frequently, 2 cases of *panophthalmitis*, and four cases of acute inflammatory *glaucoma*, one bilateral, and in the 3 others the second eye was already lost from absolute *glaucoma*—these he did not, however, regard as characteristic of la gripe.

Danis reports a case of *phlegmon of the orbit* following grippal pneumonia; a man 34 years old, with proptosis, pupil immobile, floating particles in vitreous, postneuritic atrophy, retinal hemorrhages along superior temporal vein, and edema of nerve; sinuses negative. This he regards as a sequel of pneumonia, as occurs in scarlatina, diphtheria, typhoid, puerperal fever, pyemias, septicemias, parotiditis, and erysipelas of the face; which is a metastatic condition provoked, according to Birch-Hirschfeld, Bartels and Gutmann, by a thrombophlebitis of the orbital and retinal vessels. Herbert mentions *dacryocystitis*, orbital abscess with frontal sinusitis and ethmoiditis, frequently retrobulbar abscess and eventually exenteration, 2 cases of metastatic *panophthalmitis*, scrophulous types corneal ulcers, all as being observed by him during the course of gripe, but that he had not seen optic nerve or retinal involvement.

TETANUS.—A case of tetanus with ocular manifestations, rarely observed, is reported by **Roques and Condat**. In this case the pupil in average dilatation presented an exaggeration of the phenomenon of Schiff, and a sort of permanent *hippus* with oscillations of great amplitude. These alternate movements of pupillary contraction

and dilatation were without particular rhythm, and without relation to cardiac beating, veritable "pupillary nystagmus." The pupil was frequently in repose under examination. Under the action of light or accommodation, these pupillary movements had great amplitude. On provoking pain, pupillary dilatation was extremely distinct, and a cutaneous excitation brought about *mydriasis*. In chloral sleep, when the patient was unconscious of cutaneous excitation, this sign appeared with the same intensity and same regularity. At the moment of the spasmodic exacerbations, the pupillary dilatation is so regularly noted, that examination of the pupil alone informs one of the approach of the paroxysms. The *hippus* is noticed after the epileptic crisis.

Van der Hoeve relates two cases of tetanus after ocular lesions; in both cases the injury was from splinters of wood, and the tetanus bacillus was cultivated from the splinters. Tetanus after injury to the eye has proved fatal in about 82% of cases, according to Waggenmann's compilation of 50 and Castelain's quite recent 22 cases. Metal splinters are less dangerous than wood, because tetanus bacilli retain their virulence on wood for years, and of 2 cases reported it is the more alarming, as the wood splinter had made merely a slight superficial wound involving only the conjunctiva and cornea, whereas no case of tetanus from superficial injury from metal has been known to occur.

ENCEPHALITIS LETHARGICA.—**Buzard** in discussing the clinical aspects of encephalitis, states that the name is unfortunate because an inflammation of the encephalon could produce as many symptoms as there are functions of the brain; diplopia and intellectual dullness he regards as the most common symptoms in mild or ambulatory cases. This does not indicate that the oculomotor nucleus is peculiarly the incidence of the morbid process, any more than the nucleus of any other nerve, but rather that the slightest defect in the condition of acute muscle imbalance could not be very well overlooked by the patient. The lethargy

is probably due to internal hydrocephalus, the result of occlusion or partial occlusion of the aqueduct of Sylvius.

Gordon gives an extensive analysis of types of encephalitis; in which classification he discusses many phases of the disease. He separates the following: ambulatory form, myoclonic type, clonic type, hemiplegic form, convulsive type, meningeal, Parkinsonian, bulbar, neuralgic and neuritic, mental type, cerebellar, poliomyelitic, sensorial type, paraplegic, and incomplete forms. He points out three fundamental symptoms:—(1) ocular palsies, (2) somnolence, (3) rise in temperature. Differential diagnosis he makes in some detail from meningitis, botulism, hemorrhagic superior polioencephalitis, tumors of brain, cerebral abscess, anterior poliomyelitis (bulbar and pontine varieties), intoxications, uremia, and diabetes, narcolepsy, comatose states, cerebral syphilis, etc.

Malling has seen many of these cases, and states that somnolence and paralysis of the branches of the oculomotor nerve give the principal symptoms. He discusses *ptosis*, isolated and associated paralyzes, pupil phenomena, disturbances of accommodation, nystagmus, etc. Theories as to exact relative locations of 3rd nerve centers are gone into at some length. Sleep is said to have a center located in the gray matter surrounding the aqueduct of Sylvius; a lesion in this region could give somnolence and also involve one or more of the 3rd nerve centers, giving ptosis etc. Different centers are supplied by branches of several different arteries, hence a small lesion along a bloodvessel could involve one group of centers without disturbing others.

Holden makes a study of the clinical histories of 100 epidemic encephalitis cases, and analyzes the ocular symptoms in detail. Among these there were 4 cases of blurring of the optic discs, *papilledema* 1; ptosis 56 (bilateral 45), extrinsic muscle involvement sufficient to produce diplopia in 55 cases, nystagmus in 32; pupil irregularity in 15, inequality in 20, sluggish or

absence of light reflex in 35, weakness of accommodation in both eyes in one case; facial muscle weakness both sides in 24, of one side in 49; in all 73 patients. He points out the frequent association of ptosis with paralysis of the external recti, a combination rarely observed in any other disease, and also calls attention to the characteristic features of the sluggish pupil as being frequently accompanied by defective convergence reaction, and associated often with paresis of accommodation without dilatation of the pupil.

Trantas studied 30 cases, the principal symptoms being diplopia, difficulty in reading, ptosis, and lethargy. Diplopia is not so disturbing to patients after a short time, altho the paralysis persisted for months in some instances. The false image seemed to be disregarded as in concomitant squint. Ptosis in 50% of his cases, affected accommodation in 30%, inequality of pupils in 67%, diplopia in 50%. He describes chorioretinal changes in two cases, which he believes is rare. **Miner** and **Freeman** report 20 cases of acute epidemic encephalitis, ranging from 9 to 79 years of age, the most prominent symptoms being headache, lethargy, muscular fibrillation, asthenia, and cranial nerve paralysis.

Bollack reports 20 cases, and discusses the ocular symptoms, summarizing as follows: diplopia 20, bilateral paralysis of accommodation 18, nystagmic movements 17, inequality of pupils 14, paralysis of associated movements, or ptosis 12, strabismus 9, disturbances of pupillary reflexes 5, no fundus lesion, no visual disturbance. **Bartels** writes of the ocular symptoms as follows: ptosis, paralysis of accommodation, vertical paralysis, occasional nystagmus, rarely retrobulbar neuritis, and sometimes exophthalmos. He regards the disturbances as nuclear, entering from the cerebrospinal liquor into the surroundings of the Sylvian aqueduct, so that superficial nuclei were damaged first. The earliest, most intense and most enduring phenomenon was the paralysis of accommodation; the 3rd, 6th and 7th the most frequently affected. Differential diagnosis is made

from cerebral tumors, Wernicke's hemorrhagic polioencephalitis, tubercular meningitis, acute apoplexy and lues.

Waardenburg makes a thoro study of this subject, reviewing the history of the disease, the cases published in Holland, and the accounts of it in other countries. He reports 2 cases, one with *contraction of visual fields* both eyes, 10 degrees to 20 degrees, with enlargement of both blind spots, and a ring scotoma including the blind spot, between 10 degrees to 20 degrees from central fixation point in each eye; the other case had contraction of both fields, 5 degrees to 10 degrees, both blind spots normal, the fields of fixation showing paresis of convergence. A third case was given with charts of the field of fixation, showing irritation of convergence.

He discusses in detail general symptoms, sensory symptoms, motor symptoms, cerebral nerve disease, ocular symptoms, visual disturbances, paresis of convergence, anisocoria, and paresis of associated movements. He disagrees pointedly with Bartels as to involvement of the nuclei only, and the cerebrospinal fluid only being the source of infection, and states his reasons, (1), known cases of hemiplegia and hemianopsia, (2), disturbances of lateral fixation, (3), questions existence of supranuclear centers for associated movements and convergence, (4), optic nerve defects explained only by defects of fibers, (5), bilateral isolated paralysis of ocular muscles without affecting the nucleus, (6), lasting disturbances of pupillary reflexes without dilatation point more to tract than to nuclear involvement, (7), pathologic research shows perivascular lesions, therefore, infection via blood circulation must be accepted.

Eleven cases are reported by **San-tonoceto** in discussing the ocular syndrome in encephalitis, no real ptosis being present, the drooping of the lid being due to hypotony of the muscle; diplopia in seven cases, only one showing a distinct paralysis; nystagmus and pupillary disturbances; no fundus lesions. **Pickard** discusses the mild cases

of encephalitis and points out, especially, paresis of the ciliary muscle, paresis of the iris, diplopia, and optic neuritis. **Reverchon** and **Worms** divide 15 cases into three groups, giving the ocular symptoms which appear in the beginning of the disease, those occurring during the development and those seen in the later stage of the disease.

Bollack, reports 12 cases and, by analysis of symptoms, attempts to show the relative frequency of the ocular symptoms as differing from those of the preceding epidemic, and states that only ocular motility was affected, nystagmus and diplopia being almost constant, the photomotor reflexes normal. **Vedel**, **Giraud** and **Oliver** report a case of loss of photomotor pupillary reflexes in a patient 24 years old, also inequality and irregularity of the pupils. **Bourges** and **Marcandier** report a case with bilateral complete ptosis, paralysis of left internal rectus and paresis of accommodation; neither diplopia nor nystagmus present. **Hammes** and **McKinley**, observed 27 cases, 6 of which ended fatally; the 3rd and 6th nerve were most frequently affected; in 7 cases complete immobility of the pupil, in 2 miosis, in 1 mydriasis, in 3 anisocoria.

Hogue reports on the frequency of the disease, giving the usual eye symptoms and histories of 4 cases, 1 post-mortem. **Willcocks**, discusses three cases in detail. Six cases were made the subject of a paper by **Taylor**, who points out special features of each case as representing different types of the disease. **Harris** reports seven cases and mentions especially the Parkinsonian type, and the importance of studying the mild types. **Buzzard** and **Greenfield** describe 20 cases and divide them into (1) those with hemiplegia, hemianopsia and hemianesthesia, (2) those with symptoms similar to paralysis agitans, and (3) those characterized by disturbances of the cranial nerves; ptosis, diplopia, somnolence, and pupillary and accommodative disturbances being the principal symptoms.

Abrahamson states that the main involvement in encephalitis is toxemia

of the nerve cells affecting motion, and pictures the Parkinsonian type as illustrating the fundamental one: ptosis, blurred binocular vision and accommodative blurred vision, nonmaintained ocular motion, etc. **Schultze** reports 15 cases in which the general appearance of paralysis agitans was most prominent; the tremor was present in some cases; the face mask like; but no true lethargy, no ptosis, no pupillary disturbances, no symptoms of cranial nerve paralysis. In 2 cases the symptoms were somewhat similar, but the onset of the disease was characterized by fever, lethargy, and ptosis. **Duverger** and **Barré** describe numerous ocular manifestations, especially in the Parkinsonian form. They warn that the relics of these ocular manifestations of epidemic encephalitis will have to be reckoned with in examining the eyes for years to come, and they must not be mistaken for the ocular manifestations of neurosyphilis.

Miscellaneous or peculiar types of encephalitis have been reported. **Hanns** states he has studied a new form of encephalitis; a young woman developed sore throat, an eruption on limbs, and intense meningeal reaction, but no pronounced lymphocytosis in spinal fluid; intense conjunctivitis with edema and ptosis, and double bronchopneumonia completed the clinical picture; temperature was slightly above normal, pulse normal. The illness was followed by somnolence with recovery in 2 weeks. **Bollack** reports a case of parotiditis with *paralysis of accommodation* in a case of encephalitis. **Juler** reports a case of encephalitis following an injury to the head—drowsiness, pupillary disturbances, oculomotor palsy, nystagmus. **Onuff** reports a case of bilateral *ophthalmoplegia*, almost complete.

Sala studied the histologic changes in the ciliary ganglion in encephalitis lethargica. He made numerous clinical observations and in most cases where the patient presented, before death, evident pupillary disturbances, he examined methodically the histologic structure of the ciliary gang-

lion. The subjects had presented no symptom of the extrinsic musculature, and there was no other ocular affection; the Wassermann reaction in blood and cerebrospinal fluid had been negative. The ganglions had been treated by the method of Cajal with nitrat of silver, followed by a short fixation in ammoniac alcohol. Examination showed the greatest part of the cellular elements of the ganglion had a normal aspect. There was evidence of degeneration of cellular prolongations (dendrites) and of the cellular bodies; the nature of which degeneration into round bodies of variable dimensions, the author was unable to state, not having equipment sufficient to determine the chemical constitution of these granulations, whether pigimentary or lipoids. The fact, however, that limited and circumscribed lesions during encephalitis lethargica occur in the ciliary neurone, demonstrates once more the importance which one is able to attach to the ciliary ganglion in the mechanism of the reflexes.

Sauvigneau refers to early diplopia, rigidity, ocular paralysis, lethargy, nystagmus, strabismus, pupillary disturbances, etc., and states that systematic lesions do not exist in the nucleus, but are "subependymaire." The lesions are grouped in the region of the mid-brain, which commands the ocular movements and which effect determines with peculiar frequency the appearance of lethargy. **Wegeforth** and **Ayer** (O. L., v. 15, 1918, p. 297) studied nine cases, of which five died, four coming to autopsy. They point out especially oculomotor and facial paralysis, together with symptoms indicating involvement of the long projection tracts to the extremities—ataxia, spasticity, Babinski's sign, etc. Postmortems showed similar changes in all cases; the brains soft, great engorgement of all the vessels, especially the brain stem and basal ganglion, principal lesions being perivascular exudation and diffuse infiltration of the parenchyma. No bacteria were found in any case, and attempts to reproduce the disease

by intraspinal inoculation of monkeys, rabbits or guinea pigs with filtrates from spinal cords were ineffectual.

Levaditi and **Harvier** inoculated a monkey and 2 rabbits with an emulsion of the brain of a patient, who died with the typical lesions of encephalitis lethargica. One rabbit (injected intracerebrally) died on 8th day with symptoms and lesions of encephalitis (mononuclear meningitis, perivascular collections and polymorphonuclear infiltration of the cortex). The monkey did not develop the disease. The authors studied the character of the virus which seemed active for rabbits. They found that the virus could be preserved thru regular passages in the rabbit. It became a virus *fixé*, producing death in the animal in 4, 5 or 6 days, with symptoms of torpor, myoclonus and meningeal irritation, and with typical lesions of encephalitis. After seven passages in rabbits it became pathogenic for monkeys. The virus could not be cultivated by ordinary methods; it retains its properties in glycerin; is filtrable thru Chamberland bougies. Inoculation is effective either by the cerebral route or by the peripheral nerves, ineffective when given subcutaneously.

Gabbi examined the oculomotor reflex in 4 cases of lethargic encephalitis, 2 in adults and 2 in children, and attributes the exaggeration of the reflex to hyperexcitability of the vagus center in the medulla. **Cozzolino** points out ocular disturbances, in a paper on encephalitis in Mongolian idiocy. Among those who have written of ocular symptoms in encephalitis are **Haris**, **Isola**, **Koguchi**, **Lhermitte**, **Rieux** and **Marcarian Pocher**, **Verry-Westphal**, **Tobler**, **Vian**, and **Fromaget**.

BOTULISM.—**Saint Martin** had occasion to observe four cases stricken with botulism after ingestion of smoked trout. After the usual general symptoms, appearing in 24 hrs., the ocular symptoms came on; myosis, diplopia, and mydriasis; but besides these classical ocular manifestations, the author observed some rare complications in the considerable contraction of the

visual field, and a congestion of the optic nerve and retina. Recovery was very slow. The clinical histories of twenty-eight cases of botulism, with special reference to the eye symptoms, were studied by **Nathan**, who reports paresis of the accommodation as one of the most common symptoms, next in frequency being pupillary disturbances, usually due to paresis of the sphincter, varying in degree; less commonly the extrinsic muscles are affected, especially the levator palpebrae and the abducens. **Boenheim** also writes on the ocular symptoms in botulism.

SEPTICEMIA.—**Gilbert** focusses his attention upon what he calls "septic iritis" as being that group of bacterial iritis with iridocyclitis and recurrent hypopyon, whose evolution is so grave; and which he separates from the group of iritis in furunculosis, and in the course of suppuration. There exists, he states, in effect a group, seemingly characteristic of staphylococcic septicemia, where one observes recurrent hypopyon, complicated by very marked opacities of the vitreous (cyclitis), also atrophy of the optic nerve with almost complete destruction of function. Specific treatment seems indicated if the etiology of staphylococci is confirmed. In septic iritis, the specific vaccine therapy is the more indicated because the prognosis is so grave. Staphylococci have the tendency to provoke recurring suppurations, and are an important factor in recurrent hypopyon.

Therefore, in diffuse recurrent iritis, especially in the absence of furunculosis or an analogous process, one should proceed with an injection of opsonins (250 million, 1/2 cm.) in order to clear the diagnosis. If the result is positive, one should proceed with the usual opsonin treatment in order to prevent recurrences. He states furthermore, that it is well to have recourse to antistreptococcic serum, the more so because the classical local treatment is incapable of effect in septic iritis. All the cases known of recurrent hypopyon are self

terminating in effect, frequently after years, by almost complete blindness from atrophy of the optic nerve, opacities of the vitreous or complicated cataract.

DIABETES.—A case of diabetic paralysis of the superior oblique of left eye is reported by **Bourland**; the patient 55 years old, paralysis persisting for 6 months; 2 years previously there was diplopia lasting only a few days. **Cohen** reports in detail the case of a boy, 14 years old, with diabetes mellitus, lipemia and acidosis, associated with a characteristic appearance in the retinal bloodvessels known as "lipemia retinalis." Lipemia is a condition of increased fatty bodies in the blood; coincident with the increase of the total fat, there is a rise in cholesterol content. The extreme hypotony of the globe he believes due to a dehydration of the fluid media of the eye, as occurs in other parts of the body.

ARTHRITIS DEFORMANS.—**Friedenwald** reviews the literature of the subject in its ocular relation, and reports four cases with ocular complications, one of scleritis, and three of superficial marginal ulcers of cornea, associated in one with a chronic and stubborn conjunctivitis. He believes these cases may be explained by the chronic infection, probably streptococci, underlying the arthritis deformans, secondary to a focus of infection somewhere.

TUBERCULOSIS.—**Finnoff** presents a comprehensive and practical discussion of the ocular manifestations of tuberculosis. After clearly outlining acute and chronic types of this ocular disease, the parts of the eye affected are discussed in turn. He makes a point of the importance of ulcers of the palpebral conjunctiva, associated with preauricular or submaxillary gland enlargements, as indicating the presence of tuberculosis, especially when occurring in children; these ulcers having a ragged edge and uneven "worm-eaten" base as a clinical characteristic. Varieties of tubercular keratitis and the perivasculitis in retinal lesions are treated in some detail. He concludes with an outline of tuberculin as a diag-

nostic and therapeutic agent, and urges that it be properly administered and in cooperation with an internist. Finally, he emphasizes that tuberculosis frequently occurs in the eyes of apparently healthy persons, in whom no other tuberculous focus can be found.

Burch concurs in this opinion in a paper on ocular tuberculosis, that the lesions are found in patients who appear in fairly good health, no other evidence of this or other disease present, and that it is chiefly recognized thru the tuberculin reaction, the previous general history and X-ray. Most cases of episcleritis, scleritis, sclerosing keratitis, certain other nonulcerative types of keratitis, and 10% of anterior uveitis and iritis, a few exudative choroiditis and chorioretinitis are tubercular in origin. Anterior segment lesions appear to be more definitely affected by tuberculin treatment, this perhaps because they can be observed in more detail than can fundus lesions; however, he is convinced of its value in the treatment of tuberculous ocular lesions.

Libby states tuberculous meningitis is always secondary to involvement of bones, joints, internal ear, and etc., and emphasizes that headache of sudden onset and persistent character, in an adult with history of tuberculosis either active or quiescent, should awaken a suspicion of meningitis and especially so if there is disturbance of motility of the eye, upper lid or pupils, or impairment of vision. **Ribon** discussed at length the value of the ocular examination in tuberculous meningitis.

Kerry reports 4 cases which he believes indicate some aspects of fibroplastic tuberculosis in the eye; two of these are cases of iritis, 1 keratitis, and 1 chorioretinitis. He secured prompt and satisfactory results from the injection of 1/4 gr. of iodine hypodermically, and is struck by the frequent use and recommendation of tuberculin by other observers for tuberculous ocular lesions, to the utter exclusion of all consideration of mixed infection, which may be concurrent or intercurrent in these cases. **Gallemaerts** reports a case of tuberculosis of the bulbar conjunc-

iva in a man 44 years of age; a violaceous elevation in episcleral and bulbar conjunctival structures excised, and histologic examination confirmed the diagnosis of tuberculosis.

Schoeppe reports a case of benign miliary lupoid, in which there was involvement of the ocular and tarsal conjunctivae by flat nodules, an interstitial keratitis, deep and superficial vessels, and deposits on Descemet's membrane, iris atrophic, with a few nodules and posterior synechia, lens cataractous, later phthisis bulbi. The lungs showed apical foci. The diagnosis of tuberculosis was strengthened by the ocular manifestations. Ocular tuberculids is the subject of a thesis by **Brunner**.

Guillery reviews the literature on the similarity of the anatomic findings in sympathetic ophthalmia and tuberculosis. He emphasizes the accumulation method after treating the tissues with antiformin, for facilitating the bacteriologic diagnosis. Histologic examination of an enucleated eye because of chronic iridocyclitis, phthisis, with nodules in the iris, showed in several hundred sections no typical tubercular foci; but the antiformin method rendered the bacteriologic diagnosis probable. He proved its value also in the case of miliary tuberculosis with choroidal nodules in which no tubercle bacilli could be found, but the centrifugate showed on the slide easily detectable bacilli. He further proved its value by inoculating rabbits intravenously with tubercle bacilli, obtaining iris and choroidal lesions, the half of the eye treated with antiformin regularly exhibiting bacilli. **Guillery** recommends his method in uveitis of unknown origin. The eyes must not be treated with Mueller's fluid, which inhibits the staining of tubercle bacilli.

Hess presents a paper on ocular tuberculosis, and **Fejer** writes on the same subject, including the scrophulous types in his discussion. **Hessberg** believes that ocular tuberculosis has been on the increase since the war, and states that the tendency to recovery in these cases has been slight in comparison with experience in former times.

Stark insists that tuberculin is the positive method of diagnosing localized tuberculosis; speaks of the three reactions from the injection, and emphasizes the focal reaction as the truly diagnostic one. He points out danger of general reaction in a patient suffering with general tuberculosis, also danger of focal reaction with initial dose of 1/2 to 1 milligram increased every 2 to 3 days by 1 milligram up to 5 milligram; as high as 17 milligram has been injected. He prefers old tuberculin, and reports three cases.

Hensen treated over 333 cases of tuberculous eye disease with tuberculin by Ponndorf's method of cutaneous incisions (10 to 15) and rubbing tuberculin into them. 65% of the cases showed varying febrile reaction, and no favorable results could be observed. The duration of scrophulous keratitis was not shortened or even improved; in three cases fresh infiltration of the cornea followed the treatment; in one case a latent pulmonary infection was made active. He concludes that the Ponndorf method introduces an uncertain amount of tuberculin into the body, which may cause unfavorable reactions in scrophulous children, and that its clinical effects are not equal to that of the usual tuberculin injections in which the dosage is carefully controlled.

Wolff presents a paper on the treatment of ocular tuberculosis in which he discusses the value of tuberculin. **Augstein** also writes on tuberculin treatment of tubercular ocular disease. **Velez** and **Gonzalez** divide the study of this subject into five parts, which they discuss in some detail: (1) The tuberculins and their nomenclature, (2) the reactions to tuberculin, (3) the ophthalmic reaction, (4) diagnostic tuberculin in ocular affections, (5) therapeutic tuberculin in tuberculous ocular infection, also in paratuberculosis. This subject is also treated in a paper by **Weigelin**. **Schnaudigel** writes on the use of krysolgan in ocular tuberculosis, and **Hercher** has used the Roentgen ray in the treatment of the disease.

Kraupa reports his results of the study of about 100 cases of severe tuberculosis of the eye, in which he employed partial antigens and injections of milk. In three cases of sclerosing keratitis with iritis, improvement was so rapid and marked, that it seemed as tho it must have resulted from the treatment, but other tests were very uncertain. Results from milk injections seem trustworthy as tested in 100 cases, and he ascribes the effect to the setting free in some manner of protective powers which are present.

SYPHILIS.—**Roy** believes that syphilis was imported from Asia to North Africa and that the Arabs and the Berbers infected the Moors of Mauretania, who in their turn have transmitted their pox to the negroes with whom they came in contact. In 135 cases of syphilis examined, Roy found only 16 with ocular alterations, all of these lesions being located in the anterior segment. He believes the visual acuteness of the negro is better than among any other race. He insists there is no tabes among African negroes, and that the disease is almost exclusively the endowment of the white race, as he has never met it among the Malays or the three thousand Redskins which he has examined in the two Americas. His studies have led him to feel reasonably sure that certain tribes here and in Africa are now immunized against syphilis.

A comparative study of syphilis in white persons and in negroes is made by **Zimmermann**, and the principal discussion is of iritis in respect to its racial incidence and its association with certain early secondary syphilides and with neurosyphilis. He concludes that in early secondary syphilis and subsequently in the course of the disease, the negro is more liable to iritis than is the white man; that iritis occurs in more than 10% of all cases of early secondary syphilis in the negro, and is most often associated with follicular syphilides; and finally, that abnormalities in the cerebrospinal fluid of partially treated syphilitics with iritis occur with no greater frequency than in

the fluids of treated patients who have not had iritis.

Eighty-four cases of syphilis with positive spinal fluid were examined by **Stross** and **Fuchs** for ocular lesions. There were 49 recent cases, under 2 yrs., and 35 older cases, over 2 yrs. Of the 49 recent cases, 17 (6 men and 11 women) presented eye symptoms; of the 34 older cases, 19 (12 men and 7 women) showed ocular lesions. Ocular findings are described in detail. It is noticeable that among recent cases, women presented eye symptoms more frequently than men. Optic nerve involvement was the most common finding. In 8 of the recent cases there was a mild papillitis, 7 of these in women. In old cases, pupillary changes were most frequent. Visual disorders in tabes is the subject of a paper by **E. Fuchs**. Syphilitic ocular disease is discussed by **Koegel**. **Gilbert** writes on ocular syphilis in the new born.

Hirschberg reports 6 cases of glaucoma in syphilitic individuals, in which the syphilis may have been the etiologic factor. The author points out the importance of searching for the disease in glaucoma, because of favorable influence of general specific treatment. **Roorda Smit** finds that ocular symptoms in the presenile cachexia of syphilis are noted chiefly in the right eye; they include cataract, glaucoma, retinal hemorrhages, optic neuritis and nystagmus. In a paper on orbitocranial syphilis, **Charlin** reports 10 clinical observations of ocular disturbance from gummatous processes in orbit, in the periosteum near the optic foramen, or in the meninges. Some of these cases had a negative history and serology and clinical examination, but responded readily to antispecific treatment. He urges a careful examination of visual motor apparatus in all cases of periorbital neuralgia, because of a likely lesion in superior orbital fissure, periostitis with pressure on 1st branch of 5th nerve.

In a paper concerning the ocular symptoms in the subjects of hypophyseal disease with acquired syphilis,

de Schweinitz suggests the following classification:

1. Hypophyseal disease in the subjects of acquired syphilis, but the pituitary body lesion not necessarily, and probably not, itself syphilitic.

2. Hypophyseal disease in the subjects of acquired syphilis and pituitary body lesion definitely, or in all probability, syphilitic.

3. Hypophyseal disease in subjects in whom the history and serologic tests did not demonstrate syphilis, but in whom the favorable result of anti-luetic treatment, combined with pituitary body and thyroid gland feeding, was suggestive.

He presents a case history in detail in illustration of each of the first two subdivisions, and briefly 3 cases illustrating the last subdivision. In conclusion he suggests, that none of the ocular symptoms depending upon pituitary body disease is of itself characteristic of acquired syphilis, and these symptoms, therefore, do not differ from those exhibited by patients who are not syphilitic. It is even probable that a careful analysis of cases of pituitary body disorders, with exterior ocular muscle palsies, would show a greater incidence of such paralyses in luetic subjects, especially in secondary involvements from bony or dural syphilis. In stages of glandular insufficiency the efficacy of organotherapy is probably enhanced by simultaneous administration of mercury (preferably by inunctions) and the gland extracts, even tho the presence of syphilis is not demonstrable by the usual methods; a combination of thyroid and pituitary gland extracts is probably more efficient than either of the extracts alone.

Hereditary syphilis of the anterior segment of the eye is discussed by **Santos Fernandez**, in great detail. He refers to his large experience and study of this particular subject, and among other conclusions, states that in hereditary syphilis there is a preference for involvement of the anterior segment of the eye.

Benavides writes at length on the same subject. He reviews the history of syphilis of anterior chamber, and

gives detailed discussion of anatomic conformation of the cornea, observed by him in congenital lues. Two classes of anatomic anomalies exist in the cornea of the hereditary syphilitic—1st., modifications of circumference which represents the limbus of cornea; 2nd., modifications of curvature of cornea which can be subsequent to the modifications of the limbus or independent of this. He illustrates the irregular cornea, the elliptical cornea, the oval cornea, and shows the effect of hereditary syphilis in the production of these corneal forms. He discusses also the types of hereditary syphilis of the anterior segment—lids, conjunctiva, disease of lacrimal apparatus, conjunctivitis and keratitis eczematosa, interstitial keratitis, keratomalacia, neuropathic keratitis.

He concludes:

1. Syphilis transmitted from mother to child may be wanting frequently in clinical signs, but presents ordinarily a positive Wassermann.

2. Diagnosis of syphilis of second generation or hereditary syphilis of first generation can be made clinically by signs, dystrophies or defects, which never fail in greater or less degree.

3. Hutchinson's triad, auditory changes are less frequent, next in importance the mouth, and never failing, total or in part, the ocular signs.

4. Socalled ocular triad, stigmas of cornea, pupil and fundus of eye, never fail, more or less markedly, in total or in part.

5. Syphilis of third generation or hereditary syphilis of the second generation, is more frequent than is ordinarily supposed, as it demonstrates in most cases the existence of ocular stigma, and sometimes a positive Wassermann.

6. Adenoid vegetations in boys, leucorrhea in girls, and death of various brothers of meningitis should make one think of hereditary syphilis.

7. Ocular lesions are, in his opinion, sufficient to affirm the existence of hereditary syphilis, even with a negative Wassermann.

8. Conjunctivitis and keratoconjunctivitis eczematosa, pustulosa, phlyc-

tenular, etc., is visited ordinarily upon the children of syphilitics, and it is favorably influenced by mercury; Wassermann in most cases is positive.

9. Keratitis, fascicular or in bands, is visited almost always upon hereditary syphilitics, frequently of second generation; benefited by mercury, Wassermann sometimes positive.

10. Parenchymatous keratitis of hereditary syphilitics very exceptionally has a negative Wassermann, and its preferable treatment is Hg. and preparations of arsenobenzol.

Sidler-Huguenin writes on ocular syphilis in the second generation and bases his analysis on the study of 36 hereditary luetic families with 65 children, very carefully examined for any pathologic change clinically. The statistics are valuable because of the thoro serologic and roentgenologic examinations of these cases. In 36 marriages, 14 remained without children. In the 64 children examined, no changes characteristic of syphilis could be found; in a few cases dystrophies were observed that could not be regarded with certainty as being specific. If the male is the hereditary luetic, the chances for healthy children seem greater.

The Wassermann reaction in the aqueous is the subject of a paper by **Okazaka**. The Bordet-Wassermann reaction has been carefully investigated by **Rasquin**, who finds that this reaction with the blood is not sufficiently sensitive for requirements of ophthalmology. The author suggests a modified technic which will make it more sensitive, and for this purpose employs desensibilization of the serum. His communication concludes with some observations that show the advantages of his perfected technic.

Sabouraud compares the merits of 606 and mercury, in a paper on the treatment of syphilis. **Imamikol**, a preparation containing 27.5% mercury and made in Japan, is said to have antisiphilic properties according to **Hayashi**. He claims good results with an injection of 10% solution of the preparation. **Hirschberg** presents a

communication on the employment of quicksilver in ocular syphilis.

SPIROCHETOSIS ICTEROHEMORRHAGICA—A clinical analysis is made by **Ryle** of 55 cases of this condition, which is also known as Weil's Disease.

TRYPANOSOMIASIS.—**Roy** relates the ocular findings of his study of 418 negroes, in Africa, affected by this terrible disease. Ocular complications of this disease are uncommon. Out of these cases, he found only three showing fundus change. He reports them, each a case of double edematous papillitis, and even in these he was doubtful if due to the trypanosomiasis. He observed, however, among the 418 cases, 19 white atrophies of the optic nerve, but all following atoxyl treatment or other arsenic salts, the effect of which is now well known. He had not seen iritis, cyclitis, iridocyclitis, parenchymatous keratitis, chorioiditis, as mentioned by other authors, but perhaps the cases he examined had been early affected by the arsenic treatment? Ocular affections from trypanosomiasis are far greater among Europeans than among the blacks of Africa, and he concludes that the black offers a greater resistance to the trypanoma than to the spirocheta.

ENDOCRINES.—**Fridenberg** is impressed with the importance of endocrinology as a step forward from the cellular pathology, which looks upon the organism as a histologic specimen, and from the narrow bacteriology, which considers the body as a culture medium and most disease as an inoculation. Normal development and nutrition of an eye depends partly upon vitamins. He advises the use of pituitary extract in cases of acute glaucoma, or where there is a racial, age, or individual tendency to increased intraocular tension, in order to quiet the sympathetic system; also it should be useful in certain types of headaches.

Szily says it is impossible at present to prove clinically the direct relation of eye symptoms to dysfunction of the ductless glands. The possibility of more than one gland being involved in any particular case, is also to be con-

sidered, as many clinical syndromes are recognized as being of a polyglandular nature. From his own observations and a review of the literature, the author comes to the following conclusions in regard to polyglandular syndromes involved in the causation of certain eye symptoms:

Keratoconus—thyroid and thymus; parenchymatous keratitis—thymus, thyroid; dystrophy of cornea—adrenals, hypophysis, pancreas; nystagmus—liver, testicles, thymus, adrenals; optic nerve diseases—thymus, pancreas; cataract—myotonic dystrophy.

In another table are grouped the eye symptoms most frequently found in connection with dysfunction of the more important ductless glands.

In thyroid hyperfunction symptoms are:—exophthalmos, with Stellwag's and Graefe's signs, Moebius and Dalrymple's sign; cataract?

In thyroid hypofunction:—keratoconus?, corneal dystrophy?, intraocular tension?

In parathyroid hypofunction (tetany):—cataract, optic neuritis, pigment degeneration of posterior surface of iris.

In pituitary hyperfunction:—those symptoms due to pressure, hemianopsia, optic atrophy or neuritis, choked disc, scotoma, amblyopia, amaurosis, nystagmus; disturbances of ocular movements, also exophthalmos, iritis, cataract, intraocular tension?

In pituitary hypofunction:—pressure symptoms develop as in hyperfunction of the gland—intraocular tension?

In thymus hyperfunction:—keratoconus?, corneal dystrophy?, optic nerve diseases?, nystagmus?, intraocular tension?

In pancreas hypofunction:—cataract, iritis, neuroretinitis, in pancreatic diabetes possibly due to dysfunction of the external rather than internal secretion.

In adrenal hypofunction (Addison's disease),—pigmentation of the lids, conjunctiva, and limbus corneae, nystagmus?, intraocular tension?

Engelking refers to polycythemia as a disease of the erythropoietic appara-

tus from disturbances of the endocrinic equilibrium.

Blanco in a communication entitled, "the pathogenic action of the genital apparatus in functional disturbances of the visual apparatus," reviews the relation between the visual and genital apparatus and points out accommodative asthenopia, muscular asthenopia, nervous asthenopia, reflex asthenopia; retinal asthenopia; etc. One is too often content to label "nervous" a condition which has substantial etiology, difficult to determine, but in which because of new acquisitions of general pathology, such a resorption of material badly eliminated or default of action of the endocrine glands, are able however to be revealed.

LEUKEMIC LYMPHADENOSIS.—A case of aleukemic lymphadenosis is reported by **Tribenstein** in which, age 63 years, the blood count was practically normal, slight lymphocytosis, and diagnosed aleukemic lymphadenosis or pseudoleukemia (Cohnheim) or maybe a preleukemic stage of a true leukemic lymphadenosis. Right eye was enucleated because entire globe was involved in a tumor extending into depth of orbit; tumor consisting of infiltration of tissue by small or medium sized lymphocytes. In the choroid larger vessels were so densely infiltrated as to be almost obliterated; capillaries unaffected, as the infiltration appeared to be primary in the adventitia of the vessels. Ciliary body and iris also infiltrated; intraocular tension greatly increased, nerve excavated; the nerve was not infiltrated but the nerve sheath was involved.

PERNICIOUS ANEMIA.—**Zentmayer** reports a case of a man, 31 years, with pernicious anemia with atypical ocular changes. The fundi rather pale, low grade neuroretinitis in the left eye, marked pallor of optic disc in right eye. In extreme periphery of right eye there was the remnant of a small hemorrhage apparently from thrombosis of a venule.

PURPURA HEMORRHAGICA.—**Ischreyt** reports three cases of morbus maculosus Werlhofii, in one of which there were small retinal hemorrhages and

yellowish foci, giving a picture similar to septic retinitis; in another there was a conjunctival hemorrhage; and in the third, woman of 30 years, iritis.

POLYCYTHEMIA.—**Engelking** reports the history of a family in which chronic polyglobulia, with marked blood alterations could be traced thru three generations. In all the cases Vaquez's disease existed without heart trouble, changes in the kidneys, or increased blood pressure. Hereditary transmission was direct to both sexes. Ocular findings were typical and distinguished from the usual aspect in morbus ceruleus (due to congenital heart trouble). Conjunctiva was lividly discolored; retinal vessels about normal caliber and course, but the veins almost black red, optic disc ruby red from congestion of smallest veins and capillaries of disc and retina. Color of the eyeground was bluish red, cyanotic, due to changes in the capillaries of retina and choroid. According to Engelking, polycythemia is a disease of the erythropoietic apparatus from, in his cases, hereditary disturbances of the endocrinic equilibrium.

Kerschner refers to polycythemia as both relative and absolute (or true) types. In true type, due to erythroblastic activity of bone marrow or to failure of destruction of red corpuscles, faulty internal secretion (suprarenal) may be the principal factor. Eye symptoms usually common and first noted, especially palsies of extrinsic ocular muscles, diplopia, scintillating scotoma, transient blindness and hemianopsias. Pathologic basis of the nervous symptoms are vascular, may be thrombotic or hemorrhagic, and cause softening which is not due to arteriosclerosis. He reports one case somewhat relieved of headache and dizziness after withdrawal of 10 ounces of blood.

GENERAL AND OCULAR CIRCULATIONS. The relation between the circulation of the eye and the general circulation is presented in a paper by **Coppez** and **de Meyer**, who have noted that there is a hypertension, even a great hypertension, which seems normal both from

the general point of view and the ocular. On the other hand there is a very slight hypertension, even in some patients no hypertension, which presents the same effect as a great hypertension, angina, tachycardia Bright's disease, retinal hemorrhages, neuroretinitis, etc. For the same variation in pressure, the amplitude of the pulse is proportioned to the elasticity of the arterial wall, becoming less as the artery is more rigid or more distended.

The amplitude of the pulse is estimated by means of the sphygmoscope of de Meyer to a minimal variation. It is interesting to observe that those patients having a normal amplitude presented no ocular lesions, and those with reduced amplitude were attacked by neuroretinitis, hemorrhagic glaucoma, or retinal hemorrhages. On the other hand, the ocular pulse as demonstrated by Moore, Bailliart and others shows oscillations synchronous with the pulse. It would seem therefore from many observations that the question of the amplitude of the pulse has as much significance in ophthalmology as in internal medicine.

AORTIC REGURGITATION.—**Zentmayer** presents the case of a man, 24 years old, suffering from aortic regurgitation, who sought advice because of *proptosis* of the right eye. Locomotion *pulse* involving the entire arterial retinal tree was present in the right eye.

ARTERIOSCLEROSIS.—**E. Fuchs** refers to numerous eye lesions for which arteriosclerosis is responsible; and the importance of detecting them early as an aid in diagnosis of arteriosclerosis, especially of the brain, nephritis, diabetes, and syphilis. He has never found the ophthalmic artery normal after 70 years of age. Syphilitic arteritis is a lymphocytic infiltration of the vessel wall, while senile arteriosclerosis is merely a degenerative change. He has found isolated foci of atrophy in the optic nerve after 70; these foci are in various parts of the nerve, from chiasm to entrance into the eye, and he gives 4 photomicrograms of these findings, stating that they have not before been described.

In discussing arteriosclerosis and the eye, Adams (O. L. 1920. p. 322) points out the importance of systematic examination of the eye for hypertension and arteriosclerosis in all patients between the ages of 45 and 55 years of age. He classifies the various stages of arteriosclerosis as follows: 1. Hyperpiesia, characterized by simple high tension, without signs of vascular or renal disease; 2. Arteriosclerosis, associated with high tension, renal and cardiac changes; 3. Chronic nephritis, with secondary high tension, arteriosclerosis and cardiac changes. He enumerates the symptoms attending each stage, and describes in some detail the fundus changes characteristic of each. He next describes an instrument devised by Thomson Henderson for measuring the arterial diastolic pressure in the eye. He refers to its possibilities, and believes further work on these lines seems to be indicated.

NEPHRITIS.—Rend-ophthalmic syndrome as described by Wolfe refers particularly to two types of retinal manifestations, that occur in the two principal types of Bright's disease. The two types of nephritis are; 1st. that in which the distinctive symptoms are albuminuric and dropsy with arteriosclerosis as a secondary symptom; and 2nd. that in which arteriosclerosis is the predominating factor, and the exudation of serum is not conspicuous. He divides the retinal changes that develop in Bright's as follows:—1st, in which exudation into the retina is prominent; 2nd, in which exudation is slight or absent, the principal feature being the manifestations of arteriosclerosis.

Lemierre reports a case of amaurosis following transitory hemianopsia during acute nephritis. Nephritis followed upon quinsy, and the amaurosis 24 hours after well developed Bright's. Recovery began on the 4th day, after abundant polyuria. Because of the perfectly normal fundi and the symptoms of eclampsia associated, the author believes there was chlorid retention, with cerebral edema of both hemispheres, which receded in the right hemisphere, thus explaining the per-

sistence of only the right transitory homonymous hemianopsia. **Leoz** writes on the alterations of the retina and of the choroid in polyuria, and insists the prognosis of these lesions is more grave than that of albuminuric and diabetic retinitis.

HEMORRHAGE. Five cases are reported by **Pincus** in which ocular disturbance followed loss of blood; 2 cases of amputation, 1 of epistaxis prolonged, 1 gastric ulcer, 1 uterine hemorrhage. In all cases there was atrophy of the optic nerve (following a papillitis) with contraction of the fields of vision. The ocular disturbance came on from 2 to 8 days after the serious loss of blood. One explanation is, that in case of extensive hemorrhage, grave lesions of the posterior cord are produced; another interpretation is that it is caused by a retinal ischemia due to extreme diminution of blood pressure and of cardiac tone, accompanied by a reflex augmentation of vascular tone.

Goerlitz also reports a case of total blindness after extreme loss of blood from duodenal ulcer. The discs were opaque and edematous without definable borders from the whitish, opaque, edematous retina. Microscopic study revealed intense edema of disc extending into layer of nerve fibres. Accumulations of polymorphous formations made up nodules between the nerve fibers. Their position and configuration remind Goerlitz of the foci of degeneration in multiple sclerosis, and may be caused by edema of the optic nerve and its surrounding fibers, due to changes of the vascular walls, possibly thrombotic processes.

DUODENAL ANKLYOSTOMA.—A case of amaurosis is reported by **Lofruscio** occurring, as he believes, with hookworm involvement of the duodenum. The optic nerve was affected.

MENSTRUATION.—**Espino** describes the case of a young woman who at the time of her menstruation always had a congestion of the conjunctiva.

DENTAL DISEASE.—In a paper entitled, "Teeth, Tonsils and Toxemia," by **Bell**, the importance of the ocular relationship is emphasized. His exami-

nation includes (1) an inspection of the mouth, (2) palpation of the gums, (3) roentgenograms of the teeth. He insists upon the tooth brush habit, and refers to the effect of tooth polishes. *Pyorrhea alveolaris* is caused by an acid excess coming back from the stomach and should be arrested by proper treatment. He believes that oral sepsis is one of the direct causes of septic gastritis, toxic neuritis, arthritis, nephritis and arteriosclerosis, its ocular complications primary or secondary to these.

Tydings writes upon the ocular relation to diseases of the nose, throat, and teeth, and refers to acute and chronic conditions from absorption of apical involvement. **Crisp** reports 1 case of glaucoma relieved after removal of a tooth, 2 cases of trachoma cleared up after the dental source of infection was removed, 1 case of phlyctenular keratitis, 1 keratitis and uveitis, 1 multiple ulcers of the lids, probably due to or influenced by dental disease, and improved on removal of the foci of infection. He believes refractive errors play a part in favoring the localization of infection in an eye.

Mc Farling states that the spread of infection from a chronic focus occurs in 3 ways; (1) by direct extension, (2) by transportation along mucous or serous surfaces, (3) by metastasis thru the blood stream and lymph channels. The last mentioned type is most important to the ophthalmologist, since the anatomic relationship of the eye is so remote from any of the usual foci of infection. He believes that in most cases the focal infection in the teeth paves the way for the pathologic results of some trivial exciting cause. He cites two cases to substantiate this belief.

Gutmann writes on the relation between ocular and dental diseases and reports 4 cases in illustration; 1, case of edema of the conjunctiva associated with infected roots of two incisors; 2nd, orbital fistula with caries and periodontitis of two incisors, due to direct subperiosteal extension of the alveolar abscess; 3rd, periostitis of orbit

with edema associated with a diseased premolar tooth; 4th, bilateral eczematous conjunctivitis with infected roots of two first premolars. **Veasey** (See p. 40) reports a case of paralysis of accommodation due to infection at the root of the central incisor. Accommodation was restored after removal of the focus.

McBean reports a case of exudative choroditis, 1 acute neuroretinitis, 1 chronic iritis from infected teeth. Effect upon the eye of absorption from dental disease is discussed by **Benedict**. A paper describing the anatomy of the eye and orbit in reference to teeth and sinuses is presented by **Maiden**. He mentions 4 routes possible for infection to pass to the eye; by continuity, by way of bloodvessels, by way of lymphatics, by way of lymph sheaths of the nerves. Obviously the teeth, tonsils and sinuses are most apt to be the locations of the foci. Next to the uveal tract, the cornea is the chosen site. Many operations are unsuccessful due to a focus of infection primarily at fault.

DISEASED TONSILS.—**Bell** refers to infection of the tonsil in ocular disease and reports a case of double optic neuritis in a man 48 years old, whose blood pressure was 270—170, etc., entirely relieved by enucleation of the tonsils. A case of paralysis of accommodation following peritonsillar abscess in a girl 9 years old, relieved in a month's time, is reported by **White**. **Veasey** has reported two cases of paralysis of accommodation due to chronic purulent disease of the tonsils, both restored after removal of infecting focus. (O. L. 1921., p. 40). **Sumner** reports three cases of subnormal accommodation, the result of focal infection from diseased tonsils.

NASAL AND ACCESSORY SINUS DISEASE.—In discussing the ocular complications in nasal disease, **Leplat** calls attention to iritis due to maxillary sinusitis, kerato-conjunctivitis from nasal affections, and retrobulbar neuritis and paresis of ocular muscles provoked by sinusitis. **Lorie** and **Lichtenberg**, in their communication on this subject,

report eight cases of ethmoid disease, causing fundus changes in 6, and ocular discomfort in 2. They recommend careful mapping fields and blind spots in these cases, and point out that enlarge blind spots and contracted fields in their experience seem to indicate posterior ethmoidal disease.

Patterson, classifies nasal diseases in relation to; (1) external ocular disease; (2) orbital affections; (3) diseases of the deeper tunics and optic nerve, as well as of the cavernous sinus. He discusses especially follicular conjunctivitis, phlyctenular conjunctivitis and keratitis, orbital cellulitis, retinal and choroidal disease, and cavernous sinus thrombosis, as ocular complications of nasal disease. **Stenger** finds in acute and chronic conjunctivitis, hypertrophy of inferior turbinate and conditions causing a narrowing of the nasal duct. In eczematous conjunctivitis there was exclusively pathologic adenoid growth. In lacrymal conditions, he mentions different anatomic conditions of the nasolacrimal ostium, and relations of the anterior ethmoid cells. Some cases of cataract and glaucoma were improved or checked by nasal operations.

Ocular manifestations of disease of paranasal sinuses is the subject of a paper by **Bordley**. He limits his remarks to optic nerve disturbances, but refers also to certain ocular symptoms most important in making a correct diagnosis. These are, orbital neuralgia, fugitive edema of the eyelids, congestion of the conjunctiva with the familiar "wet eye", recurring attacks of episcleritis, and paralysis of one or more of the ocular muscles. He believes that dimness or haziness of the margins of the disc is the most usual ophthalmoscopic picture, of inflammatory neuritis, retrobulbar neuritis, and choked disc. He is forced to disagree with the suggestion that enlargement of the blind spot is a very constant symptom of disease of the paranasal sinuses.

In 102 patients with sinuitis, enlargement of the blind spot was discovered but 31 times. It was found more often in disease of posterior than

anterior sinuses—in the proportion of 5 to 1; and never found associated with infection of the maxillary antrum. He has proven experimentally that enlargement of the blind spot will sometimes follow excessive tension within the sphenoidal sinus. In eight patients with sphenoiditis, but with normal blind spots, tampons were placed with varying degrees of pressure in the sphenoid. The fields of these patients were systematically watched and in two, definite evidence of disturbance in the nerve developed. One of these patients within an hour had a hazy color zone surrounding the blind spot; this was followed within five hours by the formation of a positive enlargement of the blind spot surrounded by a relative color scotoma.

He attempts to explain the alteration in the blind spot associated with disease of the anterior sinuses, and refers to the importance, next to that of enlargement of the blind spot, of paracentral and central scotomas. He has observed central blindness in eleven cases and is in doubt as to the direct causative factor. Damage to the nerve apparently depends more upon the thickness of the sinus walls and its proximity to the cavity of the diseased sinus than upon the intensity or nature of the sinus disease. He reports 2 cases with illustrative fields of vision.

In a study of 2225 cases of sinus disease, **Schittler** found that only 0.13 percent of the cases were fatal, and that complications occurred in only about one percent. While orbital phlegmon and other orbital complications are more frequent in infections of the frontal sinus, they are less severe than in infections of the maxillary sinus. Severe lesions permanently affecting vision are rare in frontal sinus disease; but a considerable percentage of orbital complications in maxillary sinus disease result in amaurosis and panophthalmia. Maxillary sinus infections resulting in orbital complications often are of dental origin. Nine illustrative cases are reported, 4 of these being of dental origin.

Gonzalez Sanchez points out some cases of blindness following sphenoidal

sinuitis observed by him, and warns medical men and oculists, in cases of blindness difficult to investigate the cause, against overlooking disease of the nasal sinuses. Some clinical phases of ocular involvement in sinus disease discussed by **Thompson** are related to purulent sinuitis, those in which sinus disease can not be demonstrated and certain functional disturbances of the optic nerve. He believes the practical question is,—“Are we to allow a dangerous process to go on merely because we can not invariably demonstrate it with certainty?” He does not regard the opening of the ethmoids and sphenoid as dangerous operations when properly performed, and it is therefore better in doubtful cases to operate than to risk allowing a latent trouble to continue. He reports five illustrative cases.

Jobson also writes on ocular symptoms in sinus disease. He believes headache with eye symptoms may arise from closure of the anterior labyrinth of the ethmoid, and is similar in its mode of establishment to frontal sinus headache described by Ballinger and Ewing. Thru his researches into mysteries of glaucoma, **Dowling** is led to believe that there may be a specific glaucoma poison, and thinks it may be the true explanation not alone of congestive glaucoma but also of glaucoma simplex.

Wiener and **Loeb** refer to lesions of the eye occurring more frequently from pathologic processes involving the nose and paranasal sinuses than is generally accepted. They outline the eye complications resulting from lesions of the different sinuses, (1) ethmoid cells, (2) sphenoidal sinus, (3) frontal sinus, (4) maxillary sinus. Increased intraocular tension may have a nasal origin. The influence of the ear in eye affections is limited practically to abducens paralysis.

OTITIS MEDIA.—In a contribution to the study of otitis media, **Gerdil** states the ocular complications are paralysis of the oculomotor nerve found in 9 percent of the cases, and pupillary stasis with or without neuritis, noted in as many as 60 per cent of otitis media cases.

Paralysis of the 3rd nerve is usually found in connection with intracranial complications of otitis,—circumscribed meningitis, abscess of the cerebellum, thrombophlebitis. A few cases have been noted without intracranial complications; in such cases it is difficult to explain the pathogenesis of the oculomotor lesion. Lesions of the optic nerve in otitis media are of two types; papillary stasis without immediate functional symptoms; and stasis with neuritis and rapid diminution of the visual acuity, in which cases there is a meningeal infection along the sheath of the optic nerve.

GOUNDOU.—**Durante** and **Roy** report a case. Goundou is an affection occurring among certain peoples of East Africa, is a hypertrophic “neoformation” of the face, either unilateral or bilateral, hard consistency, of conical form, which is developed as a horn at the root of the nose, and is able to attain a length so great as to menace the integrity of the eye. With extirpation it does not redevelop. Rare microscopic examinations have rendered its nature hypothetic. In 1913 the authors were able to dispose of one of these “neoformations” and made a histologic study of which the war had retarded the publication.

This excrescence is essentially constituted of fibrous tissue, which represents the major portion and in which are disseminated osseous lamellae. These lamellae are thin, straight, flattened, irregularly dispersed and amply separated, and contain ramified osteoblasts, in line parallel to the free border. The fundamental substance is fibrillary, and this tissue is very dense generally, save in some rare areolar points, where it takes a lymphoid appearance; vessels numerous; veins very large, but with normal walls; some inflammatory masses in solid fibrous tissue without arterioles in the center, with cells of defense more or less numerous.

The new formation is isolated by a thick fibrous shell (aponeurosis) so that the osseous lamellae, more numerous at the periphery, have no relation to the bone of the nose. Goundou

then is a new formation of osseous lamellae in the middle of an old inflammatory focus, but having besides some active portions. It is not then an exostosis, a hypertrophic osteitis as one thinks it, because the osseous elements are independent of the nasal bone. In some cases the gummatous masses become softened, and Roy has observed an old case in which the center included a sanious pulp.

Theories of etiology of goundou are, a parasite of low toxicity; possibly a spirillum, or trypanosome; and other agents of infection. But Roy has observed several cases in which it existed without any trace whatever of other infectious manifestations. It is thought, also that it may be the result of certain ritual cicatrices, certain tattooings, the materials employed being the vehicles of infectious germs. Goundou has been described as occurring at other locations (clavicle; inferior maxilla, peroneum, tibia), always in the absence of histologic examination. Therefore it is necessary to remain in doubt as to the identity of these lesions, which may have been accidental inoculations.

INTRACRANIAL HYPERTENSION.—**Schupfer** reports the case of a woman of 44 years, who had recurring periods of *hydrocephalus* since 10 years of age; attacks came on once a month or two months independent of menses; pregnant 9 times, bearing 6 children to term. Attacks of intense headache, vomiting, dimness of vision, inability to stand, and agitation, but no fever, occurred lasting few days. Recent attacks have been more grave, with transient paralysis. Blood pressure is high and optic disc congested. Immediate lumbar puncture brings relief and seems to hasten subsidence of the attack.

A case of transitory bilateral amaurosis with hypertension of cerebro-spinal fluid is reported by **David**. A child after mumps and grippe was suddenly stricken with blindness of both eyes, accompanied by headache and vomiting, cerebro-spinal fluid evidently under tension. Evacuation of a quantity of the fluid was followed by rapid

amelioration of symptoms and soon complete restoration of vision. The ophthalmoscope eliminated a local cause. A differential diagnosis is made especially from uremia. **McDonald** reports eight cases, six of choked disc and two optic atrophy, due to different causes, intracranial hypertension being secondary to injury in two of these cases. The eye and cranial hypertension is the subject of a paper by **Natale**.

DISEASE OF CENTRAL NERVOUS SYSTEM.—The ocular manifestations of *encephalitis* occurring in *Mongolian idiocy* are described by **Cozzolino**. A paper on the ocular symptoms of encephalomyelitis is written by **Fromaget**. **Hassin** reports a case of polioencephalitis superior and inferior, in a man, 21 years, complaining of inability to swallow (6 weeks duration), inability to judge distance and speech defects. Examination revealed paralysis of all the cranial nerves (from 3rd to 12th), disturbance of spacial sense, dysarthria, and dysphagia, the clinical picture of ophthalmoplegia and bulbar paralysis. Histologic examination showed marked degeneration of the gray matter, especially of the midbrain and medulla, and proliferative changes in the glia tissue.

In discussing the eye and the central nervous system in a paper, **Steindorf** refers especially to the importance of the pupillary phenomena. He dwells upon the three types of eye conditions most frequent in diseases of the spinal cord—optic atrophy, muscle paralysis, pupillary changes. Fifteen percent of *tabes dorsalis* cases are blind with optic atrophy; in twenty percent of cases, paralysis of eye muscles (third nerve most frequent, 6th less frequent, 4th least frequent); sixty to seventy percent show loss of pupillary reflexes. This is contrasted with multiple sclerosis, in which complete atrophy of the nerve rarely occurs, the temporal (partial) atrophy often discovered in very early stages, preceeding other symptoms. Paralysis of eye muscles occurs in twenty percent of cases of multiple sclerosis, the sixth affected more frequently than the third. Nystagmus or

nystagmic twitching is often of diagnostic importance, but loss of pupil reflexes is very rare in multiple sclerosis.

Leichtmann reports a case of multiple sclerosis with long interval which presented a retrobulbar neuritis. Twelve years before a retrobulbar neuritis had appeared as an initial symptom, but at that time the diagnosis of multiple sclerosis could not be made. During the interval vision had been good and the central scotoma had disappeared.

Van der Hoeve has written on the eye symptoms occurring in tuberosc sclerosis of the brain. Tuberosc sclerosis is tumefaction in different organs of the human body, described in 1880 by Bourneville, who found in the autopsy of an epileptic idiot potato like masses of sclerosis in the brain cortex, hence the name "sclerose tubereuse of hypertrophique du cerveau." Besides in the brain, these sclerosed masses have been found in the ventricles, in the kidneys (subcapsular), in the heart, in the thyroid gland, and in the skin. These patients usually die before twenty-five years of age. At a certain time of life, intelligence comes to a standstill and they rapidly become idiots; convulsions appear, and except for the skin involvement it could not be differentiated from genuine idiocy. No etiologic explanation has been accepted altho syphilis of the parent with multiple hemorrhages in the offspring, hemorrhage from tedious labor and chronic inflammatory causes have been suggested.

He reports a girl, seventeen years of age, with typical adenoma sebaceum (Pringle type), vision in the right eye reduced; she was backward and had epileptic convulsions. In the right eye on the optic disc, and connected to it with a pedicle from the nasal side of the new growth, was a tumor of whitish color about 2 D.D. in diameter, also many greyish, round patches about 2 diopters high, lying in the layers of the retina. In the left eye, vision normal, four of these flat tumors, and at the temporal side of the disc a small arterial vessel with multiple aneurisms.

In asylums for idiots he had found five other patients with tuberosc sclerosis, all of whom showed in the retina the same kind of flat tumefactions, one also a tumor of the optic disc. He showed photographs of each fundus taken by Dr. Wertheim-Solomonson which exposed each fundus in detail. These photographs were of valuable assistance to him in studying from time to time the changes, which he observed take place in a cyst at the temporal side of the optic nerve, emptying itself and shrinking, later refilling only to again empty its contents into the vitreous. After two months it no longer appeared, but five other cysts were seen. He claims to have observed thru these studies a cystic degenerating tumor of the optic disc.

Oloff draws very fine distinctions, pathologic and clinical, between ocular condition in cerebral syphilis and those in *sclerosis in plaques*, and cites considerable statistical data as to frequency and importance of these ocular conditions in each.

Nicholich writes on the syndrome of Claude Bernard Horner after extirpation of lymphoma in the neck. A paper on the genesis and significance of trigeminus disease is published by **Ochoterena**.

Certain neurologic aspects of ophthalmic cases are presented by **Taylor**, as subjects in which ophthalmic surgeons and physicians have a common interest. These he considers under three headings.—(first) some ocular palsies, (second) visual failure, and (third) defects in the visual fields.

MENINGISM.—**Kubik** reports three cases of this condition after ganglion anesthesia of the eye. The right eye of a girl, aged 10, of weak constitution, was enucleated under local anesthesia with 2 ccm. of a 1% novocain-adrenal in solution, injected into the ciliary ganglion, on account of absolute glaucoma with secondary hydrophthalmus. After 12 hours the child became restless, with marked rigidity of the neck, turning back of the head, pain on movement of the head, convulsive cries, abolition of patellar reflexes, i. e.—meningism. On lumbar puncture the

fluid rushed out under high pressure and was of sanguinolent color with a greenish hue, but with no pathologic changes. Temperature subfebrile. Condition much improved after this, and normal on the 4th day. Kubik thinks that the injection needle entered too far and injured a cerebral vessel, causing a slowly increasing hemorrhage. The other explanation was that the injection of the novocain solution in the cranial cavity caused toxic phenomena. The same occurred in a man, aged 20, but the meningism lasted only a day, and in a decrepit woman, aged 45, in whom the symptoms disappeared within 10 days after 3 lumbar punctures of hemorrhagic fluid.

HYSTERIA.—**Pfingst** writes on this subject as it affects the eye. Newer ideas concerning hysteria are propounded by **Wollenberg**. He states that blepharospasm, disturbance of convergence mechanism and nystagmus are merely abnormalities, and not at all to be regarded as symptoms of hysteria as emphasized by Bielschowsky. He asserts there is no characteristic symptom of hysteria. It is primarily a psychic phenomenon, a sort of dissociation of consciousness, resembling hypnotism in some of its aspects. In such a condition normal nerve control is destroyed and any of the nerve reflexes may be interfered with.

PSYCHONEUROTIC ASTHENOPIA.—**Parker** refers to this condition as becoming greatly increased by oculists in recent years, and recites three cases to illustrate the import of his remarks.

OPHTHALMIC ZONA.—**Proust** states that this affection coincides rather frequently with individuals manifestly attacked with syphilis and tuberculosis. He sets out with these facts in order to demand if the specificity of zona has been maintained, or if it were not rather the manifestations of a commonplace eruptive syndrome of variable etiology. Furthermore, the work published recently has indicated a tendency in favor of a non-specific etiology and of polymorphism of a zonatal process.

The existence of a meningeal reaction during zona is sufficiently demon-

strated by the facts. This is after all a meningitis characterized histologically by the lymphocytosis, by the hyperalbuminuria of the fluid, and revealed clinically by the signs, such as the headache, rigidity of the neck and the bradycardia. It is surprising that one is able to come upon the zonas during such infections as tuberculosis, syphilis, pneumonia, mumps, and grippe. Definitely ophthalmic zona presents itself as a syndrome responding to an inflammatory process localized in the Gasserian ganglion and accompanied by meningeal reactions of an essentially variable nature.

In the second part of his thesis, Proust searches to establish the relation between the ocular complications and the zonatal meningitis. Apropos of the anesthesia of the cornea, if frequently observed in zona, Proust shows that there is excited there a veritable neuroparalytic keratitis, presenting in different degrees, all acknowledging a point of identical departure,—the ganglion of Gasser. Therefore it is possible to suggest that certain varieties of neuralgias and hemianesthesia of the face, neuralgic herpes of the cornea, and neuroparalytic keratitis are zonas without eruption. Also in admitting this, is it possible to better establish proof of the meningo-ganglionic origin of ophthalmic zona?

Pierron reviews all the ocular lesions which had been observed in ophthalmic zona—conjunctivitis, in general benign, ulcer of cornea, interstitial keratitis, hypopyon keratitis, mild iritis, iritis with synechia and hypertension, irido-cyclitis with hypertension, hemorrhage in the anterior chamber, hemorrhagic retinitis, detachment of the retina, optic atrophy and optic neuritis. He studied also the iritic paralyses, cycloplegia, ptosis, paralyses of oculomotor, of the sympathetic and of the facial.

SPINAL DEFECTS.—In a paper on the significance of spinal defects and pain, occurring in relation to ocular disease, **Mills** refers to primary disease of the cervical sympathetic as being the basal cause of glaucoma, and says that the pressure of cervical tumors, of medias-

tinal polyadenitis, and of fracture dislocations of the cervical vertebrae have given striking evidence of the effects of deviation from normal sympathetic control over the eyes. Results of excision of the superior cervical ganglion in glaucoma show this operation to have been followed by improvement in 40 to 70 percent of the cases. Numerous cases of pupillary irregularity and more or less obvious variations in rapidity and degree of pupillary action, are connected with enlarged cervical glands, mediastinal growths, aortic aneurism, pulmonary phthisis, pneumonia, inconspicuous or frank thyroid tumors, and all manner of shoulder girdle, vertebral, and brachial traumas and deformities.

Mills concludes that the ocular spinal functions are related in three ways: (1) thru direct sympathetic nervous connections; (2) thru aid given the position sensing mechanism of the retinae and extrinsic ocular muscles. (3) thru accessory visual function of the stabilizing muscles of the neck and shoulder girdle. Interruption of these relations may be expressed as symptoms occurring either in the eye or the neck, and unilateral or bilateral according to the form and degree of interruption. The nuchal pain which follows prolonged or intense ocular fixation is due to strain of the muscular stabilizing system of the head, exaggerated by faults of skeletal alignment. These strains are also present in acute and chronic intraocular inflammations, as the result of holding the head rigid in order to reduce the pain due to motion, or to gravitational effect.

OCULOCARDIAC REFLEX.—**Roubinovitch** describes his manometric oculocompressor with which one may compress the eyeballs from 1 to 35 c. m. mercury. It can be stopped at a certain degree if one wishes to study effects of monocular compression; and it can be kept at the desired degree of compression as long as necessary by the hands of a competent operator. This instrument allows one to compress the eyeballs in a manner easy, regular, progressive, regressive, meas-

urable, comparable, durable and astatic. With a few variations it may be used on animals. At a certain degree of ocular compression the oscillations of the manometric index are isochronic with the radial pulse. By means of a sphygmograph fitted upon the course of the oculocompressor, beats of the ophthalmic artery may be definitely registered. In cardiac pathology the apparatus may be used for diagnosis of functional troubles.

Roubinovitch and **Tideman** have studied the oculocardiac reflex, in its relation to arterial tension, in 12 cases of hydrocephalus. In 8 cases compression of the eyes caused an immediate and exaggerated slowing of the heart, which persisted even after compression ceased. In 4 cases, with slight compression, there was at first an acceleration of the pulse rate, followed when the compression was increased by a slowing of the rate, and finally a marked acceleration when compression ceased. The arterial tension was reduced also during the compression of the eyes; the systolic pressure varying from 14 1/2 to 10, and the diastolic from 12 to 6. The pulse grew weaker as the compression was increased, and finally became thready and difficult to count. The exaggerated oculocardiac reflex and the effect on arterial tension in hydrocephalus is explained by the authors as being due to the increased intracranial pressure in hydrocephalus, which is still further increased by the compression of the eyes. This results in increased pressure on and irritation of the pneumogastric nerve, which affects the heart action.

Naccarati explains the Dagnini-Aschner phenomenon, its centripetal pathway via the trigeminal nerve, its centrifugal pathway via the vagus, and refers to Aschner's contention that the phenomenon can not be attributed to stimulation of the vagus by increased intracranial pressure. Naccarati undertook a series of observations on different groups of subjects, both normal and pathologic, the pathologic cases including tabes, general paresis, psychoneurosis, thyroid states, feeble minded-

ness, and a group of different organic nervous diseases. There were also 165 normal subjects included in these observations, and the following results were obtained.

The oculocardiac reflex has its individual differences and variations, like the pulse. Normal persons are subject to the same changes in this reflex as have occurred in many pathologic conditions; hence the reflex cannot constitute a positive sign for differential diagnosis, but can serve only as an indicator of probability. For clinical and psychologic purposes, the algebraic difference between the pulse rate without the ocular compression, and its rate during the compression should be given instead of the terms normal, abolished, inverted and exaggerated. The scale of the oculocardiac reflex, to be reliable, should be expressed in terms of averages.

The researches made by Naccarati on pathologic cases showed that in tabes the reflex index is zero, or very small; in exceptional cases it surpasses three units. In general paresis the index tends to remain small, but cases showing a larger positive or negative index are found more often than in tabes. The groups of psychoneurotic persons, the feeble minded, and those with organic nervous diseases, showed no substantial variations in their indexes that could not be found in normal subjects. In epilepsy there was a tendency to a large positive index (vagotonic reaction), but this was not always true. A definite tendency was found in hypothyroid patients to react with a positive index; the hyperthyroid patients tended to show a negative index. Thyroid extract, given to the hypothyroid patients reduced the index.

Unilateral paralysis of the second, third, fourth, fifth (motor branch), sixth, seventh, ninth, eleventh and twelfth cranial nerves did not modify the reflex to a substantial degree. Involvement of the vagus nerves greatly influenced the reflex index; involvement of the cervical sympathetic nerve caused a slight alteration of the indexes; resection of the sensory branch

of the trigeminal nerve produced suppression of the reflex on the side of the lesion, without influencing the reflex index of the other side.

Magitot and Bailliart concluded (O. L. 1920, p. 125) that ocular hypertension is incapable itself of determining the oculocardiac reflex and the phenomena observed during certain cases of glioma are of the neuritic order. On the other hand, their experiments have shown that the oculocardiac reflex is not peculiarly ocular, and that it is possible to provoke it by action upon other branches of trigeminal. Furthermore, that the modification of cardiac and respiratory rhythm, the nausea and distress which accompanies sometimes the crisis of glaucoma, are reflexes of the same order as those which one observes during hepatic and nephritic colic.

Inversion of the oculocardiac reflex as a sign of cerebral compression is studied by Laval and Girou (1919, v. 16, p. 327) in a case of cerebral abscess following otitis media, and they believe that inversion of the oculomotor reflex is a faithful sign of cerebral compression, which may admit of a precise means of indicating operation. Gabbi reports the results of examining the oculocardiac reflex in 4 cases of lethargic encephalitis, 2 in adults and 2 in children. He tabulates the results before and after injecting atropin, and attributes the exaggeration of the oculocardiac reflex in lethargic encephalitis to hyperexcitability of the vagus center in the medulla.

In his book on the sympathetic and the associated systems, Guillaume mentions the oculocardiac reflex as being one of the numerous vagosympathetic reflexes. The various reactions in this test may be due to either organic or functional changes, or they may be due to physiologic variations. All these possibilities must be kept in mind in a study of this reflex. Solger has also written on the oculocardiac reflex, and Delava has made it the subject of a paper.

Copeze and Meyer in writing of the relation between general and ocular circulations exhibit a series of very

demonstrative tracings. With subjects suffering from high tension, 270-170 mm., the amplitude varies from 12 to 1 mm. **Vinnis** writes of the comparative examination of the action of the vagus on heart during pressure on the eye and neck. **Gomez** observed four cases of beri beri in which he studied the oculomotor reflex and tabulates his results before and after compression, the difference between the two, the index, etc. He concludes that in beri beri there is the phenomenon of hypervagotonia, probably due to abnormal excitability of the spinal nerves, and caused by the toxemia of the disease.

The surgical significance of the oculocardiac reflex is the subject of discussion by **Guyot** and **Jeanneney**. They give warning that it may be dangerous under exceptional circumstances, on the other hand it may prove to be of great assistance before an operation. When this reflex is normal, the operator can proceed with confidence, but inversion of the normal response testifies to a disturbed balance between the sympathetic and the vagus, the influence of the former predominating. This is a condition found in certain forms of shock. When the reflex is abolished, it imposes the need for extreme caution in the intervention. They reiterate that the surgeon should test for this reflex when he has reason to suspect vagotonia. **Arsollier** writes on the oculocardiac reflex.

OCULOSYPATHETIC SYNDROMES.—**Landolt** reports three cases of the oculosympathetic syndromes, in 2 of these there was enophthalmos and narrowing of the palpebral fissure, pupils equal and normal; in the 3rd case the palpebral fissure was normal, left pupil slightly smaller than the right. Cocain test positive in all three cases. Adrenalin test produced widening of the palpebral fissure, but no pupillary reaction.

D'Oelsnitz studied the practical application of the oscillometer in a neurologic center during the war, and presents the first results of such a study of the sympathetic hemisyndromes.

1. In the genuine cases of syndrome of Claude Bernard-Horner (that is to

say sensitivomotor disturbances), one finds generally a distinct increase and more or less marked arterial oscillatory amplitude.

2. When to the oculopupillary syndrome (myosis, enophthalmia, narrowing of the palpebral fissure), are added the important sensitivomotor disturbances, the results are variable with the degree of predominance of the motor involvement; they depend, on the one hand upon the possible consequences of the immobilization, on the other hand upon the irritative or destructive tendency of the lesions.

3. In the well marked syndromes, there is habitually an augmentation of the arterial oscillatory amplitude, a sign capable of deciding a certain diagnosis.

Furthermore, in similar cases, the author has studied the influence on the oscillometer of different clinical defects, such as the effect of a hot bath, of a cold bath, exercise, the effect of elastic compression, etc. These effects seem to give, in relation with the healthy side, oscillometric reactions of the same import—that is to say excessive in the irritative conditions, and on the contrary, weakened in the paralytic conditions of the sympathetic.

EXOPHTHALMIC GOITER.—**Cordua** reports a case much improved by treatment with Roentgen ray, the exophthalmos and other symptoms diminishing rapidly. Later, symptoms of myxedema appeared, the exophthalmos and Graefe's, Moebius and Stellwag's symptoms having disappeared. **Moore** reports two cases of Graves' disease in which an excess of fat or greatly edematous fat in the orbit seemed to account for the marked exophthalmos noted. He therefore favors this as the cause of exophthalmos rather than the theories of blood engorgement of the orbit, or irritation of the sympathetic producing a contraction of the unstriated muscle tissue in the orbit.

SKIN DISEASES.—**Davis** reports a case of double cataract in a girl of 15 yrs. as a complication of impetigo contagiosa, also a case of erythema nodosum complicated by neuroretinitis (later uveitis) in both eyes. He be-

lieves the toxins of these diseases affected the lens in the first case, and involved the uvea in the second. **Guist** reports a case of Recklinghausen's disease with participation of palpebral and ocular conjunctiva: man, aged 45, with multiple fibromas of the skin, a partial hypertrophy of the left half of the face (without formation of strands), and of the conjunctiva of both eyes. On the posterior edge of the upper and lower lids were small greyish red nodules, and yellowish red neurofibroma at the limbus of the right eye. The microscopic examination disclosed the nodules as fibromas. Ocular symptoms in sebaceous adenoma is the subject of a paper by **Van der Hoeve**.

Two prominent theories as to the origin of molluscum contagiosum are referred to by **Kingery**: 1st, related to the pilosebaceous apparatus (either an enlarged sebaceous gland or a lobulated epithelioma arising from hair follicle); 2nd, due to a pathologic change concerning only the rete layer of the epidermis. In order to reach a definite understanding of this histogenesis, **Kingery** and his assistants carried out experiments on themselves by injecting into their own skins a sterile filtrate of molluscum contagiosum lesions, and studying the development and appearance of the resulting tumors from day to day. Various illustrations are exhibited. His conclusions are as follows:

1. Development of experimental lesions of molluscum contagiosum to be limited to pilosebaceous epithelium.

2. Abundant clinical and pathologic evidence favors the existence of the analogue of molluscum contagiosum in fowls.

3. Absence of pilosebaceous epithelium in the combs and feet of fowls and pigeons, where lesions of molluscum epitheliale often occur, justifies the conclusion that the lesions of this disease can develop independent of pilosebaceous structures.

4. Presumptive evidence points to the identity of molluscum contagiosum in man and molluscum epitheliale in lower animals. Final proof of the develop-

ment of molluscum contagiosum from the surface epithelium, must depend on the establishment of the identity of these two conditions. This identity will be proved only by the successful inoculation of molluscum contagiosum into fowls, and of molluscum epitheliale into human subjects.

5. Experiments directed toward this end have been undertaken in this laboratory.

BLASTOMYCOSIS.—**Peralta Lagos** reports a case of generalized blastomycosis with cerebral localization and amaurosis in a baby girl, aged 5. There were 14 nodules of blastomycosis found, varying in size from 1 to 3 centimeters, firm, woody consistence, painless but a trifle tender, their presence accompanied by an attack of Jacksonian epilepsy; these occurring in 4 or 5 days. He believes these attacks of epileptic convulsions are produced by the compression or irritation of the Rolandic zone by one or various nodules like those described above.

Ocular examination was as follows: no disturbance of ocular motility; mydriasis with complete amaurosis, with loss of the illuminating reflex; whitish papillas, sharply defined, with the aspect of a simple atrophy. Laboratory investigation disclosed the blastomycosis.

PURTSCHER'S DISEASE.—**Vega** adds another case to eight he has found on record of *traumatic angiopathy* in the retina with lymphorrhagia. There was a clear history, and the author describes the fundus in detail. The diplopia complained of disappeared but the fundus changes persisted. X-ray and laboratory and other methods differentiated the case from one of albuminuric origin, diabetes and lues.

PUNCTURE OF LUNG.—**Schlaepfer** reports a case in which the needle used for exploratory puncture was left open as the syringe was removed. Air was aspirated and it was drawn into a vein in the lung, and induced air embolism in the brain. This was evident from the loss of consciousness for two and a half hours and total blindness for three days. *Air aspiration* and embolism explain

many of the cases recorded as pleural shock; in others, slight shock on a nervous basis in the predisposed may be assumed.

GENERAL PAPERS.—**Meyer** reports numerous cases of *scrophulous ocular disease* treated with the partial antigens of Deycke-Much. Intracutaneous tests were made in 91 cases, and again in 56 cases; and employed therapeutically in 74 cases with no definite good results. In 3 cases the severity of the febrile reaction prevented its being continued, and in one case dangerous effects appeared in the eye. **Rutherford** treated 1,238 eye cases on the Franco-Belgian frontier, suffering from the miseries of war, deprived and poorly nourished; 1.13% of these cases were phlyctenular conjunctivitis. Scrophula and ocular disease in the war is also the subject of a paper by **Dohme**. Influence of the war upon eye diseases at home shows, according to **Seefelder's** studies, that eczematous and scrophulous diseases of the eye have increased about 100 per cent; also that the average course is more severe than formerly and that adults are attacked with marked frequency. Gonorrheal ophthalmia of the new born has considerably increased, altho no more frequent in adults. Syphilitic lesions have not increased, but this is probably because it will be years perhaps before they are manifest. Trachoma shows no increase. Acute glaucoma increased from 7 per cent in 1915 to 21 per cent in 1918, but only in females. Keratomalacia almost completely disappeared; toxic amblyopia considerably increased. **Guillain** and **Barré** have published a volume on the neurology of the eye, as related especially to the war, describing and grouping injuries to the brain, spinal cord, peripheral nerves, organic lesions produced by action from a distance, of explosions, commotions, etc.

Hoare writes a paper on the recent advances in diseases of the eye as affecting the general practitioner, and gives a general review of the practical changes in the diagnosis and manage-

ment of the more well known ocular conditions. A paper by **Whitaker** points out eye conditions of interest to the general practitioner, emphasizing especially those ocular relations which should be common knowledge both to oculist and practitioner alike. **Tyler** refers to the general practitioner as the guardian of the systemic condition, that 75% of inflammatory conditions of the eyes are due to general systemic disturbance; 75% of headaches have a neurasthenic factor. He emphasizes the importance of estimating the alkaline phosphates in the urine as an indicator of nerve metabolism.

Ophthalmology from the viewpoint of the clinician is discussed by **Smith**, three illustrative case histories being related in detail. **Terson** writes on ophthalmology and general medicine. **Schwartz** reports eight cases of refraction in illustration of visual errors in general practice. A paper by **Hardy** refers to the eye as the window of the system, using the metaphor to illustrate and to emphasize that in no branch of medicine is one more often rewarded with valuable information, even tho negative, and nowhere are the results more satisfactory than those gained in viewing the system, thru this window, the eye. Two papers on ophthalmology in modern medical practice are written by **Fergus**, which review ophthalmic practice as employed in the 13th century, then in 1851, and finally discussing the changes in ophthalmic practice since 1881.

Ramsay presents a communication on tropical ophthalmia. **Elliot** publishes a volume entitled "Tropical Ophthalmology," which is divided into ten sections, one being given to the Indian operation of couching for cataract; another to cataract extraction; much statistical data of value is presented. Of special interest may be mentioned the discussion of sun blindness, ophthalmic aspects of beri beri, cholera, dysentery, leprosy, malaria, quinin poisoning, pellagra, plaque trypanosomiasis, yaws.

Visual Hygiene and Prophylaxis

JOHN GREEN, JR., M.D.

ST. LOUIS, MO.

This section reviews the literature from December, 1920, to September, 1921. For previous references, see O. L., v. 16, 1920, p. 331.

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DIGEST OF THE LITERATURE.

ILLUMINATION.—About 15 per cent of industrial accidents are caused by defective lighting. These accidents cost industry \$300,000,000 every year, a sum more than the cost of the lighting. Ninety per cent of employes have defects in vision, and in the majority of cases these could be remedied by glasses. Poor eyesight causes ill health, carelessness, dullness and listlessness generally.

Simpson stresses the need for reflectors, sufficient light and lighting in stairways, passages, and storerooms, where danger points cannot be seen.

Sheard, discussing retinal asthenopia in the industrial world, states that refractive and (less frequently) muscular errors are often the superinducing causes of this condition.

An over bright light produces hypersensitiveness of the retina. This sensitiveness varies widely in different individuals. Both intensity and quality of light have marked effects upon visual efficiency. Light irritation may be a factor in degenerative changes in the retina and choroid.

A sudden bright light "hurts," by reason of the sudden and extreme contraction of the iris. Constant exposure to bright light causes a constant iridic contracture, and this, in the opinion of Sheard, is the real source of trouble in the majority of cases.

After prolonged use, the sphincter fatigues, the dilated pupil admits too much light, thus causing exhaustion of the retina. Thus the eye gets into a non-sensitive condition, with the result that the retina is capable of responding to powerful stimulation only. Hence the eye becomes "blind" except in the strongest of lights. In others, the retina becomes hypersensitive, and incapable of bearing normal exposures.

The arrangement, as well as the intensity of lights, is important. As far as possible light should come from above, behind and to one side. Many factories are overlighted, but the distribution is at fault.

An authority on factory lighting lays down the following rules:

1. Sources of high intensity must not be in the field of ordinary vision.

2. The amount of light must be sufficient for the work to be done.

3. The distribution of light should be uniform or as nearly so as possible.

4. The color should be pleasing to the eye.

Retinal asthenopia reduces eye efficiency, ultimately interfering with the subject's labors and demanding rest. A temporary retinal asthenopia induced by excessive localized lighting is conducive to accidents, since the retina is at that time blunted and nonsensitive. "Illumination, natural or artificial, may cause eyestrain by being too bright or intense, by being not bright nor intense enough, or by being improperly placed" (Woll).

When light is too bright, pain, headache and discomfort are caused by contraction of the pupil, lid muscles, and, finally the facial muscles. When light is poor, a sense of strain is soon felt, incident to the dilatation of the pupil, the compression of the lids and the contraction of certain facial muscles. When light is poorly placed, the pupil will either contract or dilate, and certain facial muscles are brought into use. In the first case, an attempt is being made to shut out light; in the second, an attempt is made to get more light; and in the last case, it may be either one or the other.

Woll states that the present tendency is toward over illumination. Often illumination of a room is all that may be desired as far as the illumination alone is concerned. If a room is bright, and there is a minimum of shadows, and the light is well distributed, the illuminating engineer is satisfied. Other factors of importance, often disregarded, are these: If the room is to be occupied by workers, what kind of work do they do? How are they placed? Is the refraction corrected, are colors used, are the surfaces worked on polished, glazed or dull? One corner of a room should not be brilliantly illuminated with the rest left in semidarkness. The use of the drop light is decried, especially in hallways,

where it is not easily possible to see into the space beyond the light.

The street lamp should be hooded so as to illuminate the street and pavement, not the skyline.

Indirect lights are often placed too near the ceiling, and should not be placed too far from it on account of the shadow directly under the light. The best form of indirect lighting fixture is that in which an opaque under surface is indirectly illuminated, thus avoiding shadows and promoting diffusion and equal distribution.

If direct rays of light fall on extrafoveal parts of the retina, while the object is being viewed, two impressions are conveyed to the brain, which struggle for mastery, which struggle "is experienced in terms of eyestrain." Flood lights give brightness to the upper portion of a room, but the lower part of the walls, tho actually adequately illuminated, appear dark by contrast.

The different processes in the printing industry will obviously have special requirements. Typesetting, for instance, requires a higher intensity of illumination than the mechanical operating of a press. For color work, the daylight type of lamp or color matching units should be used. The eye discomfort from improper lighting has been discussed editorially in the *Journal of the Indiana State Medical Society*.

According to **Bell** consideration should be taken of the following points:

1. Abundant and uniform illumination should be provided.
2. Glare should be prevented—usually by means of bowl-enameled gas filled lamps, with suitable reflecting equipment.
3. Workmen should not cast shadows on their work.
4. The system installed should be simple in arrangement and as low in cost as possible. However, good lighting should not be sacrificed for the sake of a small saving.
5. As few sizes of lamps as possible should be used, so lamps can be interchanged and there be a constant uniformity of illumination.

An investigation by **Powell and Allison** of recently constructed hospitals

led to the discovery, that in some the method of lighting left much to be desired. They state that in the lobby, indirect lighting is best—pendant ceiling fixtures with harmonious wall brackets, with local lighting near the elevator.

In the reception room a comfortable homelike appearance is attained with totally indirect units for general illumination, supplemented by decorative wall brackets, with table and floor lamps. Corridors are well illuminated by totally indirect units, placed about 20 feet apart.

For narrow rectangular wards, a single row of fixtures of the totally indirect type, giving an intensity of two foot-candles on the bed level is desirable. Square wards require two or more rows of ceiling outlets. Outlets with a bracket type of fixture for local lighting (with additional flush socket for electrical appliances, etc.) should be provided over or between the beds.

A modern method for night lighting of wards is the placing of lights in the floor within trough reflectors, covered by clear plate glass. Another system uses individual floor lights; small pockets lined with reflecting material are recessed in the baseboard. The light from low wattage lamps is cast in a narrow streak onto the floor between the beds.

In private rooms, the lighting may be totally indirect or semiindirect (with suitable diffusing media). Wall brackets or table lamps should be placed near the bed. They should be fitted with reflectors or shades. There should be additional lights over dressers and mirrors.

Illumination of the operating room may be varied, depending on the character of work to be done. In the auditorium type, general illumination is needed for the balcony to enable the class to take notes. General illumination of the pit is provided by wall brackets or overhead units. The operating table requires well diffused light, of high intensity and approximate daylight color "in order that the blue veins, red arteries or yellow bile ducts can be distinguished one from the other." Light should come from several directions to avoid shadows.

Three types of illumination are recommended:

1. For less exacting operations and maternity work, a diffusing type of operating table fixture, equipped with six 100-Watt Mazda C lamps in mirrored reflectors.

2. A fixture made of nickel plated pipe, shaped like a large wheel 8 feet in diameter. Eight polished steel parabolic concentrating reflectors utilizing small lamps are placed about the rim. As only a small area is illuminated to a high intensity, it is necessary to supplement a unit of this character with good general illumination.

3. A modification of this scheme is that whereby 12 prismatic angle-type reflectors are mounted on a frame work, or directly attached to the ceiling about ten feet above the floor. A splendid distribution of light on the table from all directions is thus secured.

Ludlow decries the use of white in hospitals, which he characterizes as a "winter color, dazzling and brilliant, but reminiscent of winter's cold and cheerlessness." Rather should we cover our hospital walls with colors, selecting those that give warmth and quiet.

The hospital lobby should have a "welcoming tone" — using sunlight tones if the lobby is not well lighted, and duller shades if there is plenty of real sunlight.

For the private rooms, wards, halls and operating room, a light warm grey tone, buff, is desirable. It conserves the light in the room by reflection, is not easily soiled, does not produce eyestrain, is agreeable and cheering to the patient. In the rooms with northern exposure, a little yellow should be added to simulate the sun's glow. In south rooms, which receive a good deal of sun light, a little grey and green should be added. For the operating room, a dull French grey for the wainscot, and a lighter grey for reflecting surfaces above, is recommended.

Ludlow advocates stencil decoration — fanciful leaf bands, bright berries,

conventionalized birds and flowers: for children's wards quaint animal forms or "Brownies." "Always in rooms where one must look at it for long stretches of time, make the design one which will have distinctively imaginative qualities."

"In the past years, we have overstressed the appearance of sterility and neglected to give a reasonable emphasis to the therapeutic value of consoling and cheerful environment."

Jackson, Blake and Keating state that the essentials for good daylight illumination of schoolrooms are few and simple.

1. The selection of a site and plans such that neighboring trees or buildings shall in no case rise more than 15 degrees above the horizontal plane of the bottom of the windows. Large trees, so close to the walls that they can be trimmed up, to clear an angle of 60 degrees with the horizon, may be permitted in warm climates, where it is important to keep down heat.

2. Placing the windows high enough to permit the light from them to fall at an angle of from 15 to 40 degrees in the part of the room most distant from them, shutting off all glare of light below 15 degrees, and placing such windows on all available sides of the room, and especially to the south, where the most light is obtainable.

3. Controlling direct sunlight by light shades that will intercept and diffuse it, drawn out of the way when not needed for this purpose. Placing all dark shades at the bottom of the window, and drawing them up only as needed to raise the level, below which glare is excluded from the eyes. Using polished shutters that swing on a horizontal axis to reflect light on the ceiling, when obstructions to clear sky render this help necessary.

LIGHTING CODES.—Oregon is one of the most recent recruits to the group of states having Industrial Lighting Codes, according to Murphy, and has thus been able to benefit by experience with lighting codes in other states. An examination of the table of typical

values of illumination adopted for Oregon, as compared with those of other states and with the Illuminating Engineering Society's recommendations, shows that the Oregon minimum requirements are as high as in any other state, and higher in several instances.

There is a very interesting diagram showing how accidents increase during the darker period of the year, indicating how industrial accidents depend on lighting.

INFRARED RADIANT ENERGY.—**Luckiesh**, discussing "Infrared Radiant Energy and the Eye," states that of late years many have assumed that infrared radiant energy absorbed by the eye media resulted in fatigue. Altho the assumption may be proved eventually to be true, Luckiesh is unaware of any definite experimental foundation at the present time. At present infrared radiation stands convicted upon purely circumstantial evidence.

Luckiesh does not subscribe to Crookes' inference "that it is to the heat rays rather than to the ultraviolet rays that glass workers' cataract is to be ascribed," inasmuch as (as Crookes himself determined) ultraviolet radiation is emitted by molten glass.

Infrared radiation does not have a destructive ability analogous to that of ultraviolet energy. In fact, it appears to be even less destructive to animal tissue than some of the visible radiations.

The data presented in this paper do not directly reach the root of the problem, but they are of considerable importance.

Energy quantities and densities in the eye media are established herein, and should aid the physiologist or the investigator who is interested in the question.

The author summarizes as follows: "When viewing luminous objects of small area there is no serious concentration of energy in the eye media until the retina is approached. However, when viewing extended objects, there is a relatively much greater energy-density in the lens and anterior parts

of the eye than in the posterior portions. When the retinal images are of the same brightness, there will be a very much greater energy-density in the lens when viewing an object subtending a large solid angle than when the object subtends a small angle, if the spectral character of the illuminant and the intensity of the illumination are the same. This indicates that large sources of radiation of a relatively low visual brightness might be effective in forming cataract or causing eye fatigue if the 'absorption of energy theory' is correct. In fact, if the deterioration of the lens is due to ultraviolet rays, the latter might be present in such small amounts as to appear harmless, but when it is recalled that the energy-density in the lens is very high when viewing extended objects, such as the sky, pavements, surfaces of molten glass, metal, etc., it appears to be possible that the ultraviolet rays still might be present in sufficient amount to do damage."

Rosenthal has described a method of tinting optical glass to the desired degree by exposure to the X-ray.

ARC WELDING.—Protection of the eyes of workmen engaged in welding with the electric arc is the subject of a paper by **Sylvester**. The problem of such protection is one of search for transparent material that will exclude the infrared and ultraviolet rays. The spectrum of radiations thrown off when the electrode comes in contact with metal is rich in both these portions, while the intermediate light spectrum is diminished by the dark lines present from the gasses developed. Pale green glass appears best suited to the purpose, and the addition of small amount of cobalt increases its transparency.

MOVING PICTURES.—**Coppez** states that the amount of light reflected from the screen is an important factor in cinematography. Certain individuals are content with less, others demand more, illumination. Experience has shown that the optimum illumination is about 10 lux.

In the movie theatre, the illumination is far from being uniform: the spectator who sits close to the screen receives too much light, while one sitting farthest from the screen (where flicker is least noticeable) receives too little.

With an ordinary screen the curves of equal illumination form flattened circles, and only a few spectators can be seated at or near the intersection of the curve of optimum illumination. All others receive too little or too much light (varying from 3 to 22 lux).

With a luminous screen, recently invented by Chanteux, the curves of equal illumination are paraboloid in form and, if the seats are arranged as usual, each spectator will receive practically the same illumination which varies only from 8 to 12 lux.

REFRACTION AMONG SCHOOL CHILDREN.—An interesting discussion, participated in largely by oculists engaged in wholesale refraction work among school children in England, has appeared in several recent issues of the *British Medical Journal*.

Larking objects to giving glasses to children on the basis of retinoscopy, which he insists, must be supplemented by subjective examination. He thinks that not more than three patients an hour can be measured with accuracy.

Blease insists on both objective and subjective testing. In testing children one should not ask, "is this glass better than that." If one uses several cards and takes care that lines which are supposed to correspond are not composed entirely of easily read letters on one card, and of difficult ones to read on another, then it is useful and possible to find with which glass the child reads (not says he sees) best.

Higham states that wherever possible objective methods should be supplemented by subjective. With astigmatism of 1. D. or less, "one has a little latitude," but in cases requiring a higher cylinder, "then one must place the cylinder as near as possible in the proper meridian." Six refractions an hour is much too much for accurate work. Four or even three is the limit.

Letchworth on the basis of 30,000 refractions in ten years in schools, insists on objective testing exclusively, thinks subjective a waste of time. He uses one-fourth per cent hyoscin alkaloid in castor oil. **Hughes** thinks that retinoscopy and postcycloplegic subjective tests are necessary, if we are to give a child "comfortable" glasses. To rely on retinoscopy alone, is, in his opinion, "helping still further to augment the income of the thriving prescribing optician." **Wilkins** thinks that no reliance can be placed on subjective tests in children under 12 years of age.

Niimi writes of the impairment of vision of the children of the public schools of Handá. **Brown** writes on classes for children with high myopia, and **Baldus** on the education and development of children with poor vision. **Kriegel** asks what does examination of children with poor sight teach? and **Nance**, is the human eye degenerating?

CARE OF EYES OF THE AGED.—**Gowens** finds that in the last special census report 2.2% of the blind give old age as the only cause, and that half of them until they became blind pursued gainful occupations. He urges improvement of the statistics by exclusion of such an indefinite cause, and the better attention to the hygiene of a senile eye.

Campbell pleads for the after care of refraction cases, and gives pamphlets to his patients bearing eight rules, to assist in the hygienic care of the eyes of those who come under his examination.

PREVENTION OF EPIDEMICS.—The prevention of seasonal epidemics of conjunctivitis (mostly due to Koch-Weeks and Morax-Axenfeld diplobacilli) in the hot seasons of Egypt and Palestine has been the subject of a study by **David**. As a contagion comes from without, David sought to prevent its propagation by the use of an appropriate antiseptic agent. Nitrat of silver was rejected as too irritating, as the drops had to be repeated daily. He used zinc sulphat 1%, to which was added a 5% solution of adrenalin 1/1000 (daily instillation).

Systematic use of these drops in the colonial schools of lower Galilee has prevented seasonal conjunctivitis among the school children, altho it raged among the people of the villages. On several occasions, abstention from the use of the drops resulted in the occurrence of cases which soon disappeared after the resumption of the prophylactic. No case of trachoma has developed in pupils given the preventive drops, tho David admits that much more data will have to be secured before this point is established.

De Lapersonne, Kermorgant and Jeanselme were appointed a commission by the French Government to advise as to the compulsory reporting of trachoma, an agitation started by a growing realization that the disease is increasing in France. The Commission made the following recommendations:

I. Colonial immigrants should have their eyes examined on embarking and debarking.

II. Similar precautions should be taken on land frontiers.

III. On arrival the eyes should be examined and a certificate should be issued, stating that the individual is free from ocular contagion.

IV. An immigrant with trachoma in its contagious stage should be treated in a special dispensary.

V. In industrial centers, trachomatous workmen should be sent to these special dispensaries.

VI. School children with trachoma should be sent to special dispensaries, and not returned to school until declared free from contagion. Trachoma classes should be started.

VII. The warfare against trachoma should be pursued with the greatest energy in the Colonies. Special dispensaries and hospitals should be established. Screening of schools against flies, prophylactic treatment with zinc sulphat, etc., is advised.

The Commission concludes that trachoma should be included in the list of reportable contagious diseases.

Thru the efforts of the Council of British Ophthalmologists, arrangements have been made for the treat-

ment of children attending the London County Council Schools, who are suffering from contagious eye diseases. Trachoma, chronic conjunctivitis (often with corneal ulceration) and blepharo-conjunctivitis are common in the very poor. These cases often require removal from home and need hospital care to ensure permanent cure. Otherwise they may develop corneal scars impairing vision, and lose economic efficiency in after life.

Thirty per cent of those admitted to the so-called Myope Classes are there because of "damaged eyes from inflammation."

Santos Fernandez, Leoz and Blanco constituting a commission on the struggle against trachoma, which has been increasing in the Mediterranean Litoral of Spain, recommend: The creation of special hospitals, dispensaries and schools in the region most affected; in which trachoma should be treated. That ambulatory clinics should visit the locations of disease, to cure and to popularize prophylaxis. That a state laboratory for study of the etiology of trachoma and its biologic treatment should be established. The change for the better among the London school children thru institutional treatment, is pointed out in the British Journal of Ophthalmology. **Florio** has written on trachoma and the public; and **Kostic** on the fight against trachoma and blindness; while **Talbot** takes up the prevention of trachoma.

MINERS' NYSTAGMUS.—**Stassen's** investigation was among the collieries of the Liege basin, with the object of ascertaining the frequency of nystagmus and ultimately of deciding its causation. Iron, zinc and coal miners were examined. Illumination in some mines was by naked lights (candle and lamps), in others oil and benzine safety lamps; in others portable electric lamps. 20,000 miners were examined of whom over 8,000 were seen twice during one day—just before going down into the mine, and immediately on coming up after finishing the day's work.

Stassen is convinced "that the real cause of nystagmus must be sought, not in the upward look which the miner is compelled to adopt at his work, but solely in the faulty conditions of lighting at the bottom of the mine."

The conclusion arrived at, as the direct result of the inquiry, was that "there exists among miners, working under faulty conditions of lighting, a fatigue of the visual apparatus which is ultimately transformed into a nervous syndrome, characterized by inco-ordination and exaggeration of ocular reflexes; and that occupational nystagmus, previously considered to be a well defined morbid entity, is, in reality, only a pathognomonic symptom of overstrain of the centers controlling the muscular equilibrium of the eyes."

The campaign against this disease must be carried on with two definite objectives; (a) to seek out the preventive measures which will render miners immune to attacks; and (b) to treat workers affected with occupational visual troubles.

Anderson is convinced that no man, the refractive condition of whose eyes is normal, will develop miners' nystagmus to such an extent as to incapacitate him from following his employment. Astigmatism is the most frequent predisposing cause, especially mixed astigmatism in oblique meridians. Myopia and hypermetropia act as predisposing causes in lesser degree.

The external exciting causes—posture and improper illumination—may cause a mild form of miners' nystagmus, (very frequent), but this never incapacitates the miner. Severe nystagmus may, of course, be due to the other known causes of the condition, such as affections of the cerebrum or cerebellum, diseases of the labyrinth, sclerosis cerebri, etc. The disease is particularly prone to manifest itself at the age of presbyopia.

Anderson suggests a fixed refraction standard as a prerequisite to admission to pit life as follows: Snellen 6/18 separately or Snellen 6/12, both.

Failure to pass this test should bring the man under the supervision of the eye surgeon. With H. or M. not higher than 1. D., the man should be acquainted with the trouble, and advised to seek other employment. If the error of refraction exceeded 1. D. or if As. were present, the man would be excluded from work as coal miner. The benefits derived would accrue to the individual, the owner and the nation.

PREVENTION OF INJURIES.—The Bureau of Standards has recently published data under the caption "National Safety Code for Protection of Heads and Eyes of Industrial Workers." This report discusses various manufacturing processes, each of which requires special protectors—goggles, masks, helmets, hoods and shields.

The various groups are as follows:

Type A. Protection from relatively large flying objects, such as chipping, calking and riveting.

Type B. Protection from dust and small flying particles, as grinding metals and some woodworking operations.

Type C. Protection from dust and wind, as locomotive driving, automobile driving, and electric spot and butt welding.

Type D. Where protection from splashing metals is required, as babbiting, pouring hot metals.

Type E. From gasses, fumes and liquids, such as handling acids and caustics.

Type F. Protection from excessive amount of dust and small flying particles, as sand blasting.

Type G. Reflected light or glare as snow covered ground, reflected sunlight.

Type H. Protection from injurious radiant energy with a large reduction in intensity of the visible radiant energy, as electric arc welding.

Wuerdemann discusses injuries to the eyes in iron and steel trades, agricultural pursuits, building trades, and domestic life. Objects most frequently causing injuries are finger nails,

straws, twigs, knives, shears, bits of glass, pins, awls, pieces of metal and nails. Foreign bodies may be driven into the eye or thru it. Burns are caused by flame, sun or electric light, hot metal, ashes, gas, steam, oil, etc. Cauterization may be due to molten metal, acids, alkalies, lime burns, arsenat of lead, etc.

The eyes are involved in 8 per cent of all injuries, altho their combined surface is only 1/375 of the surface of the body. The explanation lies in the constant exposure of the head, especially of the eyes, in modern work.

As 50% of all eye wounds are produced by tiny fragments, protective visors and metallic shields are useful in preventing them.

A careful history, which should include the names of witnesses, and sketches should be made in all injury cases. The examination should include a determination of vision, direct and focal illumination, ophthalmoscopy, diaphanoscopy, the use of the sideroscope and X-ray. The examination should be conducted with tact and sympathy, by which means malingerers are more apt to be discovered. The examiner should bear in mind the possibility of self inflicted damage.

Some of the unions stipulate that "there shall be no physical examination of workers." The discovery of an eye defect prior to employment would make it possible to advise the applicant to go into a less hazardous occupation. If a defective eye is injured, (there having been no previous examination) one cannot tell what proportion of the loss of vision is due to previous defect and what to the injury. This is unfair to the company.

White would very strictly enforce the use of goggles, and states that "the vast majority of vocational accidents can be reduced to a minimum by protective measures that we have at hand."

VISUAL EDUCATION.—As an important step towards the conservation of vision, **Sharp** urges that the subject of the prevention of blindness should be brought before the children in school, once a week, and not restricted to a few minutes talk in the Parent-Teachers' meeting once a year. He points out that it is a child that brings his defective vision to the attention of the parent, and cites the experience of President Roosevelt in support of his plan. **Wilson** discusses the use of film presentation as an adjunct to other instruction in grade and high schools.

Ophthalmic Sociology

CLARENCE LOEB, A.M. M.D.

CHICAGO, ILL.

This section carries the literature from December, 1920, to October, 1921. For previous references, see O. L., v. 16, 1920, p. 341.

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DIGEST OF THE LITERATURE.

PROFESSIONAL STANDARDS.—Würdemann thinks that it is advisable to have some form of recognition of ability in our specialty. The present method of a certificate from the American Board for Ophthalmic Examinations is the best possible for the young men. For older men, however, this method has the possibility of the injustice, due to personal enmity, as exists in the case of exclusive medical societies. Nevertheless, they should try to obtain cer-

tificates as an example to the younger men. Ellett defines a specialist as a man who has fulfilled the usual requirements of medical education, and then by study and practice has fitted himself with special knowledge of certain diseases or of the diseases or certain organs, and by equipment, physical, mental and mechanical, is prepared to render a service in these particular conditions, which is better than that which can be rendered by other men

not so equipped. Incidentally, he does this special work exclusively. The purpose of the American Board for Ophthalmic Examinations is explained and endorsed. The specialist should endeavor to aid in the increase and spread of knowledge by writing papers, attending medical societies, etc. **Hobart** describes an ophthalmic case record system which makes the case histories accessible for studying, reporting, and purposes of literature.

OPTICIANS AND OPTOMETRY.—The Texas State Journal of Medicine comments on recent decisions concerning optometry, and says that optometrists are endeavoring to have a law passed permitting them to practice. The tendency of many leading physicians in Texas has been not to oppose optometry legislation, provided it does not conflict with the medical practice act. However, optometrists are tending to combine with medical quacks, which fact will cause all physicians to oppose them. A large part of the press of Texas is in favor of optometry legislation because of various, incorrect premises. The California State Journal of Medicine compares the training of ophthalmologists with the lack of it in the case of optometrists, and mentions some of the disastrous consequences resulting from the patient with failing vision consulting an optometrist and receiving glasses, when treatment or operation is indicated.

Kenny says that the Section on Ophthalmology of the Australasian Medical Congress would assist opticians to secure better training in their craft, but would refuse to have anything to do with legal recognition of people without medical training. The Medical Journal of Australia reports the withdrawal of the original Opticians' Bill, and substitution of one drawn along the lines of the Opticians' Act of Queensland (1917), with the addition of a subclause prohibiting anyone but a registered medical practitioner from examining the eyes of anyone under the age of 16. Even this was disapproved of by a minority report, and from the report of the pro-

ceedings, it would seem that the bill was tabled.

Gonzalez takes up the proper use of glasses and the opticians, and **Knapp** insists on registration of sight testing opticians.

VISUAL REQUIREMENTS OF SERVICES.—**Barrett** believes that the visual requirements of military recruits are too high. Sailors and railroad men require 6/12 or better vision, especially if there is loss of color vision, but the latter is not a factor in the case of the rank and file. A vision of 6/18 O. D. is sufficient if the left eye is not blind, i. e. can count fingers at 3 ft. If the recruit shoots from the left shoulder, a vision of 6/18 in either eye is sufficient, provided there is no progressive disease in the better eye. In Class B., the vision should be 6/36. The other regulations do not require change. **Howard** claims that a flier should have normal or better than normal vision, good color vision, and especially equality of vision in the two eyes. Failure of the latter leads to errors of judgment in landing and consequent disaster. **Santa Cecilia** writes on acuteness of vision in military service as estimated in Brazil.

Schackwitz tested street railway employees and found that two-thirds were adapted for their work. Tests for color vision, etc., are necessary. He gives the psychologicoptic tests on employes, but does not consider such tests practicable, as there are no simple psychologic tests for reaction time, etc. **Augstein** advises strict requirements for new employees, but relaxation for those already in railway service. Employees are divided into 3 groups on the basis of vision. Those on the border line of two groups should be examined for ocular lesions and refractive errors.

Verwey has found that the correlation between vision and capacity for work can be represented by tridimensional projection. It is possible to construct isoenergetic lines, all of whose points have the same visual value for both eyes together. For a given occupation, one has only to determine the necessary vision, and then there will be

found on these lines all possible combinations. **Vierling** advises uniform regulations for individual classes of labor thruout the German Empire. He divides railway labor into four groups, and gives the visual requirements of each. **Gilbert** gives the requirements for visual acuity of railway employees.

BLINDNESS, PROVISIONS FOR THE BLIND, AND PREVENTION OF BLINDNESS.—**Wilson** says that the scope of the industrial ophthalmologist includes proper treatment of the injured eye, shop lighting, and prevention of accidents, especially by the use of goggles. Foreign bodies should be removed by a physician and not by a fellow workman. The X-ray should be used to determine whether or not there is an intraocular foreign body. In the discussion, **Bellows** said that it was difficult to get the employees to wear goggles.

Halliday had opportunity to examine the eyes of 71 children in the New South Wales Institute for the Deaf and Blind, 46 boys and 25 girls. Of these 17 had become blind from ophthalmia neonatorum. These seventy-one cases of blindness accounts for nearly all the blind children in the State during the past ten years, giving testimony to the work accomplished in this institution.

Daulnoy states that the School for the Blind at Cannes was founded for the reeducation of war blinded. The director and several assistants are blind. Instruction is given in useful occupations, such as massage, typography, dactylography, and instruction in foreign languages. Eighteen out of 25 graduates have obtained paying positions. **Pritchard** states that the "Sunshine House" takes care of the child before it has reached the age for public care. It is inconceivable how neglected some of the children have been found to be. Sometimes, months are required for instruction in cleanliness and independence. They are taken into the kindergarten as soon as possible and instructed in speech and hand work. The Council of British Ophthalmologists comments on cinema

eyestrain, and advises opening of the Swanley Ophthalmia School to non-paupers. Various committees are mentioned. The British Journal of Ophthalmology states that the Swanley Ophthalmia School was originally established to care for paupers, but at the request of the Council of British Ophthalmologists, any child attending a London County Council school is to be admitted, provided that the number does not encroach on the accommodation of those for whom it was originally intended.

Thomson writes that the school children of Glasgow have been regularly examined since 1905, by skiascopy. The cooperation of the teachers rarely fails, and the subjective examination of the older children is performed by them. **Tennent** believes that there should be a connection between school clinics and eye hospitals, which would be beneficial to both children and oculist. The school oculist should spend his morning at the clinic and his afternoons at an eye hospital and in private practice. **Herzog** says that the Berlin School for those with Poor Vision admits children with vision from counting fingers at 1 M., to 2/10. They are taught independence and self care. Children apparently feeble minded, but really suffering from poor vision, are also accepted by the school. Strain on the eyes is avoided. Acoustic associations are used to help the eyesight. Out of doors work and use of the typewriter are advised. **D'Albe** has called attention to the optophone intended to enable the blind to read by sound.

The report of the Departmental Committee on Blindness gives the names of the men appointed by the Minister of Health to report on causes of blindness, as well as defective sight adequate to impair economic efficiency, and to suggest measures for prevention. **Henderson** says that there are 600,000 completely blind in a total population of 315,000,000 in India, and many more are in the process of becoming blind. The Hindoo is careless and will not attend to his eye trouble

in time, especially since to do so would often require a visit to a distant city and remaining there for some time, Cataract, small pox, trachoma, and ophthalmia neonatorum are the most frequent causes of blindness. The author recommends: I, A campaign against ophthalmia neonatorum; II, searching for the blind and bringing the benefits of modern surgery to them; III, formation of village medical agencies to keep in constant touch with the patients; and IV, travelling hospitals and dispensaries. **Fleming** describes a visit to the Government Ophthalmic Hospital at Madras, and mentions recent improvements and interesting points in routine and treatment, especially of cataract.

Uhthoff says that of 187 war blinded in the Breslau clinic, 92.3% were caused by gun shot wound and 7.7% by disease. The methods of caring for the blind are described. In the second part the author discussed employment of the blind. **Bab** reports on the cases of war blinded seen at the clinic of Silex, which in Dec., 1920 amounted to 3,222, comparing with those previously reported by Silex. 2,677 cases (5,344 eyes) were due to injuries, usually of the eyeball, and 445 cases (890 eyes) were due to disease. The various causes are given, with the number of cases of each. **Darrieux** examined 267 blind children of 10 years of age or less, and found the causes of blindness to be injury (14), ophthalmia neonatorum (58), trachoma (2), congenital malformation (11), congenital cataract (37), buphthalmus (16), interstitial keratitis (17), keratomalacia (1), iridochoroiditis (13), myopic choroiditis (8), retinitis pigmentosa (2), optic atrophy (23). The rest were due to various causes, such as diphtheria, exanthemata etc.

Mell writes on the blind in Vienna, **Harrison** on the care of blind and deaf children, **Harper** on the Commission for the blind in New York State, and **Chapple** inquiries what is to be done for the feeble minded blind.

Latimer reports on a uniform type for the blind, **Machts** a reading ma-

chine for the blind, **Merwin** reports on the work of the American printing house for the blind. **Hayes** writes on educational survey in schools for the blind, **McAloney** on conservation of vision classes for the blind, **Molter** and **McManaway** give suggestions how schools for the blind may take advantage of vocational training given by the Federal Board.

Mondolfo declares that the blind must substitute an increase in their tactile and auditory senses for their lost sight. He advises the use of measuring and cutting tools, arrangements for determining the position of certain objects, and appropriate occupation. Electric apparatus of various kinds are very useful, and they have been greatly developed at the School for the War Blind at Milan. The author describes how the blind can be employed in various industries. **Moullin**, **Gould**, **Pearson** and **Bruce-Porter** speak of the work done by the Association of Certificated Blind Masseurs, and recommend them. They take cases only with the consent and advice of medical practitioners. The Medical Journal of Australia calls the attention of practitioners and institutions to a well qualified masseuse who desires employment.

Aubaret states that the Academy of Medicine has adopted the proposal of de Lapersonne to make the reporting of trachoma obligatory, and requests the opinion of the Société Française d'Ophthalmologie upon that point.

COMPENSATION FOR LOSS OF VISION, MEDICOLEGAL QUESTIONS.—**Caiger** reviews 700 ophthalmologic examinations for pension boards. Several interesting cases of malingering are noted, in addition to the various pathologic ocular states found. **Campbell** reports two cases of a traumatic syndrome, where it was difficult to make a diagnosis from malingering and hysteria. This fact is important from a medicolegal standpoint. **Santa-Maria** says that the lessons learned in avoiding military service have been carried over into peace times in trying to obtain compensation for injuries. The author advises that the facts learned

by physicians during the War should be remembered in this connection. For the malingerer he advises severe punishment, by depriving him of all privileges due to working agreements, and the publishing of all facts with the names of those guilty. **Fertig** reports the opinion of accident practice in the question of traumatic parenchymatous keratitis.

In Italy, the condition of the patient before the injury has no bearing on the estimation of compensation, which depends only on the relation of his present condition to his ability to work. **Ricchi** discusses the Italian laws and the opinions of ophthalmologists of other countries. He found nearly one-half of 800 workers in a large factory had subnormal vision. However, this was somewhat dependent on the illumination. Loss of 1/3 vision does not affect the patient's ability to work. Vision of 0.7 is normal working vision; of 0.05 is industrial blindness. Tables are given showing the relation of vision, industrial vision and percentage of loss.

Lohmann divides the judgment of the ophthalmologist in medicolegal cases in 3 heads: (1) The evaluation of vision; the binocular visual field of the one eyed man; aphakia; (2) The estimation of the loss of function of the other eye or another organ, in loss of earning ability; (3) Possibilities in ophthalmic injuries. Illustrative cases are given. **Stieren** explains the meaning of 20/20, etc., vision, and gives tables of percentage of loss of vision, accepting 20/220 as industrial blindness. He explains, also, the working of the Workman's Compensation Act of Pennsylvania. **Bridges**, who is the medical inspector of factories in Great Britain, reviews the eye diseases occurring in workers as a direct result of their occupation. The conjunctiva is the part most frequently affected, the lesions of the cornea, retina, pupil, optic nerve, lens and ocular muscles are noted, and nystagmus is mentioned. **Sharp** gives the statistics of 333 ocular industrial accidents, with the details of several cases.

Mehl discusses the various tables of loss of vision and compensation. He claims that the fraction showing vision by the use of Snellen's letters is a correct expression of the amount of vision; that is, that 20/40 means actually a loss of 50% of vision, etc. It is a simple test, easily understood by laymen, and is a just one. Accidents causing loss of peripheral vision alone are so rare as not to be taken into consideration. In New York, loss of binocular vision is equivalent to loss of an eye, therefore this does not have to be considered. **Brown** takes up eye injuries and workmen's compensation law in Ohio.

Higgins reviews the compensation law of Wisconsin, and gives the table of the Milwaukee Oto-Ophthalmic Society. 20/200 is taken as industrial blindness or 100% loss, and from this point the percentage decreases in an irregular manner, explained by the author. There are comparisons with other tables. In the discussion Smith suggested allowing 1/2% for each loss of 1 foot distance. **Gradle** spoke of other factors which should be taken into consideration, such as muscular injury. Young said that 20/20 vision is better than 200/200. Black thought that compensation should be based on visual acuity not at 6 m., but at the patient's working distance. **Holt** gives elaborate tables for estimating the loss in earning capacity due to functional disability of the various parts of the body, but especially of the eye. The method of arriving at these tables is explained, and illustrative cases of their applications are given. **Passera** writes on the estimation of results of ocular accidents; and **Vogel** on the compensation for the loss of an eye which was blind before accident.

Loeb comments on the decision of the Supreme Court of Wisconsin that the physician is not a party to the agreement between employees and employers, and therefore has a right to render a bill that he thinks proper. The application of this decision to oculists, especially in their relation to insurance companies, is discussed.

Brocx and also **Gravestein** write on the evaluation of loss of an eye thru injury.

The Supreme Court of New York recently affirmed an award under the workmen's compensation law by which a claimant was compensated for hysteric blindness of a healthy eye resulting from an operation for removal of the other eye after injury. The court argued that the blindness was the indirect result of the original accident; that, in spite of the psychic foundation of the trouble, the patient in actual fact did not see; and that, if a neurasthenic condition consequent on accidental injury was compensable, then clearly a hysteric blindness forming a constituent part of that neurasthenic condition must also be compensable.

ACCIDENT INSURANCE.—The Journal of the American Medical Association reports the decision of the Supreme

Court of Appeals of Virginia, which reduced the judgment for loss of eye of an unskilled workman from \$15,000 to \$10,000. It said that the matter of compensation must be settled by the jury, except where partiality or prejudice has been shown. However, when other verdicts have been rendered, these must be taken into consideration. In 18 cases in 10 different states, damages ranging from \$1,400 to \$15,000 had been given, or an average of \$5,424. Considering the increased cost of living, the court thought \$10,000 a reasonable verdict. The Medical Record reports the decision in the case of Tracey vs. The Standard Accident Insurance Co., as rendered by the Maine Judicial Court. A motorcyclist ran thru a swarm of flies, one of which struck his right eye with such force as to give much distress, the injury finally resulting in blindness. The court held that this was an accidental injury within the meaning of the policy.

Education, History, Biography

WILLIAM H. CRISP, M.D., F.A.C.S.

DENVER, COLORADO.

This section carries the literature from October, 1920, to October, 1921. For previous references see O. L., v. 16, 1920, p. 352.

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DIGEST OF THE LITERATURE.

TRAINING IN OPHTHALMOLOGY.—A committee of the American Board for Ophthalmic Examinations presented a systematic review of the character of graduate teaching in ophthalmology in a number of American centers. What has been available in the past was clinical teaching of variable quality, supplemented by voluntary courses outside of clinical work. What, says the committee, is needed and is now beginning to be supplied, is systematic teaching of fundamentals, followed and supplemented by clinical work. The cities covered by the report are Boston, New York City, Philadelphia, Chicago, St. Louis, San Francisco, New Orleans, Ann Arbor, Minneapolis, Rochester (Minnesota), and Denver. The only institutions offering work on the new plan, namely the systematic teaching of fundamentals, are the Hermann Knapp Memorial Eye Hospital, the New York Postgraduate School, the University of Pennsylvania, the University of Michigan, the University of Minnesota, and the University of Colorado.

Benedict, writing on the preparation of ophthalmologists for group practice, believes that the greatest advances to be made in ophthalmology will be along medical lines, and that more intensive training in medical ophthalmology is necessary to fit men for special work in group practice. For this purpose, graduate courses in ophthalmology covering periods of two or three years should be offered in hospitals and clinics thruout the country. **Foster** laments that there are no schools where one can take up ophthalmology or oto-laryngology and learn either from the ground up. He suggests that none of those now practicing either specialty had the requisite

groundwork in the anatomy, physiology, or pathology of the special organs. An editorial in the British Journal of Ophthalmology suggests that for satisfactory teaching of ophthalmic pathology a well stocked and well arranged museum, together with a good series of typical microscopic sections or microphotographs, is essential.

Aufmwasser writes that the Vienna clinics are handicapped by insufficient supplies. Americans desiring to study in Vienna are welcome in most of the clinics. The British Journal of Ophthalmology mentions the appeal of the Moorfields Hospital for funds to keep up the work in that institution, briefly reviews its history and names several famous Americans trained there and the institutions founded by them.

Jackson's essay on the best papers for a scientific meeting argues against repetition of what is common knowledge and against the recital of laboratory details incomprehensible to the average worker. From a paper read before a society meeting, the auditors should be able to grasp an interesting and important idea that is new, and that can be adequately presented in the time allowed; or the writer may offer unusual clinical cases tersely described, or accounts of special therapeutic and diagnostic procedures. Truly original investigations require too much detail to furnish the best subjects for such papers.

In his Presidential address, **Story** discussed the ophthalmic education of medical students urging the following reforms: (1) That each candidate for license to practice should be compelled to attend an ophthalmic clinic for three months. (2) That his final examinations should include a clinical examination by ophthalmic specialists.

Greenwood devoted his Chairman's address to the postgraduate study of ophthalmology, emphasizing the value of attendance upon ophthalmologic societies. **M. Wiener** has called attention to the graduate work of the American Academy of Ophthalmology and Oto-Laryngology, inaugurated in the year 1921. **Troland** has written on the progress of visual science, and **Haenel** on the enthusiasm developed thru teaching. **Bulson**, reporting on the Knapp Testimonial Fund, is anxious to have the younger men, who are members of the Section on Ophthalmology of the American Medical Association, realize that this fund is available for carrying out original research work.

HISTORY AND BIOGRAPHY.—The American Journal of Physiological Optics devotes a good deal of space to the celebration of the centenary of the birthday of von Helmholtz. **Mendenhall** writes an account of the life of the famous physicist, largely drawn from a review of his career written by the same author twenty-five years ago. **Shastid's** translation of the original essay in which von Helmholtz described his ophthalmoscope is made available to a larger public than it has already reached thru the American Encyclopedia of Ophthalmology.

An extremely interesting account of the life of Thomas Wharton Jones, the famous British ophthalmic surgeon, is given by **Godlee**, who speaks in part from personal contact with Jones. As a student of Robert Knox, Jones was indirectly implicated in the "resurrectionist" or body snatching scandal of 1826 in the city of Edinburgh. He devoted a good deal of energy, especially in the later years of his long life, to defense of religious orthodoxy against the doctrine of evolution. He was for a time closely associated with William Mackenzie, whom he helped with his well known "Practical Treatise on Diseases of the Eye." His scientific work included observations on the state of the blood, and the changes that occur in the blood during inflammation and the healing process, and among other discoveries was that of the ameboid

movements of the white corpuscles. He wrote a number of books, including a manual of ophthalmic medicine and surgery, which was illustrated with beautiful colored engravings and woodcuts from his own drawings. In 1847, four years before Helmholtz' discovery of the ophthalmoscope, Jones failed to appreciate the importance of a similar instrument shown to him by Babbage, its inventor. In 1851 he became professor of ophthalmic medicine and surgery at University College, London, and ophthalmic surgeon to the University College Hospital. In 1881, at the age of seventy-three years, he had fallen into absolute poverty, from which he was rescued by a private subscription list, and later by pensions from the English government. By the time of his death in 1891 he was so far forgotten that his name failed to appear in the Dictionary of National Biography. **Reed** has published a sketch of the late Mortimer Frank. In **Ebstein's** Four Centuries of Physicians' Letters, are some from J. Mueller, Helmholtz and von Graefe.

Boegehold gives an account of the life and work of Schleiermacher (1785-1844), who was born in Darmstadt and there occupied various public offices. He published a number of papers on optics. His principal work was a book on analytic optics, the first part of which was published in 1842, but the completion of which was prevented by his death. Some notes on the ancient history of Ophthalmology in Egypt have been published by **MacCoallan**. **Nordman** has written about the first cataract operation in Finland, and **Schevensten** upon the folk lore of pilgrimages of persons with eye diseases in Belgium.

The evolution of ophthalmology at Geneva, Switzerland, is traced in considerable detail by **Gourfein**. Ophthalmology as a special study did not begin in Geneva until 1891, when the chair of ophthalmology was founded; altho voluntary courses in ophthalmology had been conducted since 1873. The first exclusively ophthalmic practitioner in Geneva was Auguste Barde,

who came there in 1869, and who was instrumental in founding, with money furnished by one of the Rothschilds, the famous ophthalmologic hospital opened in 1874. In 1915 Barde was succeeded by Gourfein in the professorship of clinical ophthalmology at the University of Geneva, and in 1920 Gourfein and his Swiss colleagues Gonin and Vogt took over the management of the *Revue Générale d'Ophthalmologie*, founded in 1882 by Dor and Meyer, and discontinued in 1916, on account of the war, by the French editors Dor, Rollet, and Truc. **James** reproduces a letter written by Benjamin Gibson of Manchester to his publisher in 1810 on the subject of the publication of his monograph entitled "Practical Observations on the Formation of an Artificial Pupil, with Remarks on the Extraction of Soft Cataract Thru a Puncture in the Cornea."

The visit of Lieutenant-Colonel Henry Smith to the United States gave rise to interesting personal descriptions of "Jullundur Smith," as he is generally known in India. The more intimate of these papers is by **Vail**, who pictures the daily routine in which Smith disposed of the diagnosis of as many as one hundred cases per hour. With very little assistance from the British government, the Jullundur Hospital took care of an average of four hundred and fifty patients, most of them cataract cases. The Victoria Memorial Hospital of Jullundur, opened in 1909 with a capacity of over five hundred beds, stands as a monument to Smith's skill and administrative genius. It was built under Smith's personal supervision, with money raised among local potentates and citizens. **Meding's** account of Colonel Smith describes his day's work in hospital and private practice.

White, who writes on the history of ophthalmology and oto-laryngology in the state of Virginia, was invited to settle in Richmond, Virginia, forty years ago, at a time when there was only one eye, ear, nose, and throat specialist between Washington, D. C., and New Orleans. His paper includes a

history of the Richmond Eye Infirmary.

Under the title "The First Scientific Work on Spectacles," **Wood** reviews *Daca de Valdez'* work on spectacles, published at Seville, Spain, in 1623. Very few copies of the work are extant. The one studied by Wood was acquired about six years ago by the library of the Surgeon General of the United States army. The author was a notary of the Inquisition. The text comprises three books, the first two dealing with the anatomy of the eye and the physiology of eyesight, and the third book made up of four dialogues between teachers and pupils.

The physiologic optics of antiquity is the subject of a paper by **Frobes**, and **O. Wiener** has written on the contest between Newton's theory and Huygens' of the nature of light. **Müller** has written on the history and evolution of the grinding of lenses, and **Pflügk** and **Rohr** on new findings in the history of lenses. **Pichler** has also published some contributions to the history of lenses.

An account of the spectacle makers of Regensburg is given by **von Rohr**. About the year 1600 spectacles were made of horn or leather. The glass used was domestic or Venetian, the former being preferred on account of its greater refractive index. The strength of the lens was indicated according to the age of the wearer for whom it was intended, and the optical values of such lenses can now only be guessed at. There were twelve numbers, six convex and six concave, and it is probable that combinations of these were used to secure different strengths.

As interpreted by **Hirschberg**, the philosophers of ancient Greece had three kinds of theories concerning vision. According to the first, during the act of vision something proceeded from the eye to the object looked at. According to the second theory, something passed from the object to the eye. According to the third, the emanations from the eye and from the object encountered one another. Thus Hipparchus declared that rays stretched

from each eye and surrounded external objects and so furnished perception of the latter to the sense of vision. Epicurus thought that thin layers were continually detached from the surface of an object, and that these layers, preserving the form of the object, moved with extraordinary rapidity thru empty space and into the eye. Theophrastus handed down the following presentation of the visual theory of Empedocles, who sought to combine the theory of emanation from the eye with that of emanation from the object: The center of vision is fire; this being surrounded by water and earth and air, thru which the fire, being thin, penetrates, as with the light contained in a lantern. But the pores of fire and of water are alternate; and thru the pores of fire we are able to recognize white, and thru those of water black. But Aristoteles criticizes Empedocles as appearing to believe at one moment that we see because light goes out of the eye, and the next moment that we see because of emanations from the things seen. Aristoteles himself came near the modern conception of vision in the following statement: "Whether it be light or air which occurs between the object seen and the eye, it is the continual movement thru this which gives rise to vision." The contributions of the Greeks to optics were noteworthy. Their understanding of the rectilinear transmission of light was essentially correct, and they correctly stated the principle of rectilinear perspective. The second work on optics which we possess from Greek origins, that of the famous Ptolemaius of Alexandria, contains the angle of refraction for the passage of light from air into water and from air into glass for an angle of incidence from ten degrees to sixty degrees, accurately calculated.

Schoute describes a peculiar type of bifocal spectacles from the first half of the nineteenth century. The reading addition was contained in a separate pair of rims hinged to the temporal joint in such a manner, that they could either be folded forward behind the distant pair of lenses or turned out-

ward and backward so as to lie alongside the patient's temples. It was manifestly necessary to take the whole apparatus off the face in order to make the change in either direction.

From a work in which the mortal illness of Judas Iscariot is described, Hommel and Hirschberg deduce an application of the Greek word *dioptra* to the eye, and conclude that a special dioptra or lid speculum was employed, according to the story, to elevate the greatly swollen upper eyelids of the betrayer of Jesus.

EXAMINATIONS, CERTIFICATES, AND DEGREES.—A report presented to the Section on Ophthalmology of the American Medical Association, by the American Board for Ophthalmic Examinations, stated that the certificate of the Board had been awarded to more than 150 ophthalmologists, and that about as many more applications for the certificate were then pending. The report discussed the value placed upon case reports by the Board. An editorial in the British Journal of Ophthalmology, discussing the recent establishment of a diploma in ophthalmic medicine and surgery by the Conjoint Board of the Royal College of Physicians and Surgeons, argues that the diploma does not meet the need for a higher diploma in ophthalmology. What is still required, says the editorial, is a higher grade examination which will give reliable evidence that a successful candidate is well equipped to hold the post of ophthalmic surgeon at a general hospital. It would be desirable for a higher diploma in ophthalmology to be granted either by the Royal College of Surgeons or by the Conjoint Board of the Royal College of Physicians and Royal College of Surgeons.

In an editorial in the American Journal of Ophthalmology Jackson points out that examinations into qualifications for special practice may do good, first by stimulating to more systematic study those who desire to specialize, second by leading to the provision of improved courses of graduate instruction, and third by enabling the medical

profession and the public more intelligently to choose those to whom they intrust patients or themselves for special treatment.

OPHTHALMIC HOSPITALS.— **Hirschberg** relates the history of the development of private eye hospitals since 1822. In 1905, there were 21 university eye clinics, 26 public eye hospitals

and 108 private eye hospitals, since which time the latter have enormously increased. They are a peculiarity of Germany, being very rare elsewhere, even in Austria before the War.

Duran and **Pava** publish the statistics of 348 operative cases treated in the Ophthalmic Clinic of Santa Lucia at Bogota, 1916-1920.

Current Literature

These are the titles of papers bearing on ophthalmology received in the last three months. Later most of them will be noticed under Digest of the Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically usually by the author's name in **heavy-face type**. The abbreviations mean: (Ill.) illustrations; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention copies of papers or reprints should be sent to 318 Majestic Building, Denver, Colorado.

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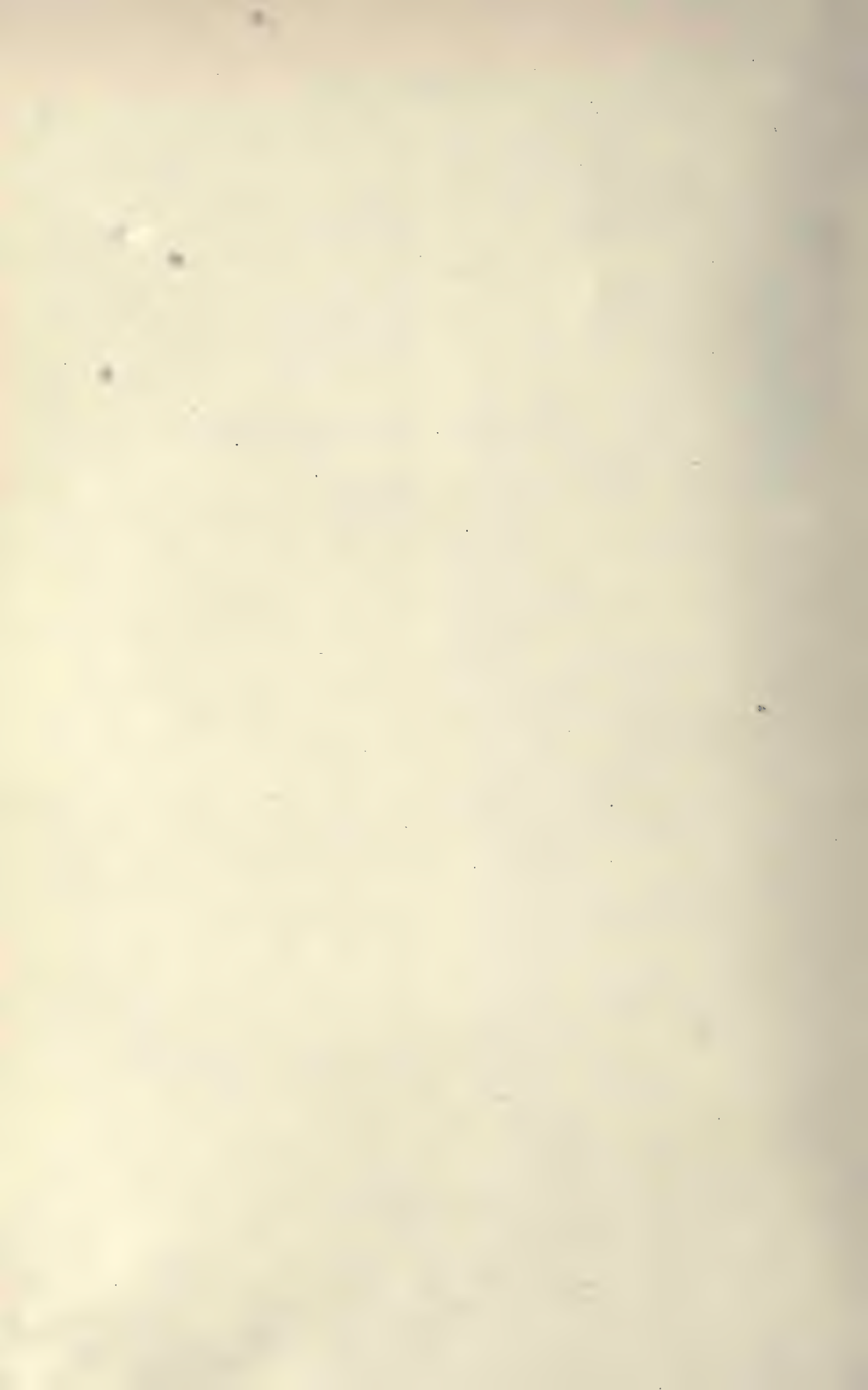
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Arrangement of Contents

This volume, essentially a continuation of the Ophthalmic Year Book, is divided into sections corresponding to those of earlier volumes, the general arrangement of which are here shown.

The **bibliography** of each section is arranged alphabetically by authors' names. The titles of papers are given in English, sometimes abbreviated or altered to indicate better what the paper is about.

The **digest of the literature** gives new facts or theories, and indication of the ground covered by important papers relating to ophthalmology.

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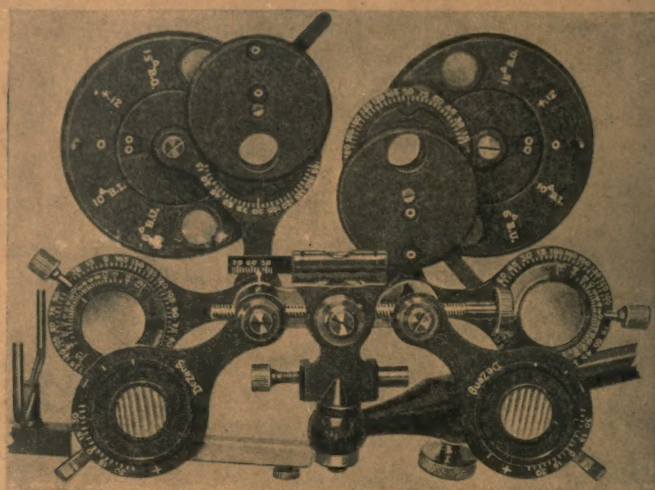
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